

THE FISHES OF ALASKA.

By BARTON WARREN EVERMANN and EDMUND LEE GOLDSBOROUGH.

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An investigation of the salmon fisheries of Alaska was made during the summer and fall of 1903 by a special commission appointed by the Commissioner of Fisheries at the request of the President, and a report thereon by David Starr Jordan and Barton Warren Evermann, published January 30, 1904, as House Document No. 477, Fifty-eighth Congress, second session, considered fully all the phases of the salmon fisheries concerning which legislation was urgently needed. Large collections of fishes and other aquatic animals were secured, however, and much information concerning the habits, abundance, and distribution of the salmon and other fishes. It is the purpose of the present paper to put on record the more important of these facts and to discuss more fully some of the chief problems connected with the salmon fisheries.

In order to represent fully the scope of the investigations of the special commission, it has been thought advisable to include in this report the species of fishes obtained during the dredging and other collecting operations in British Columbia and Puget Sound. All species previously recorded from Alaskan waters have been listed also, and all Alaskan specimens in the U. S. National Museum have been examined. Attempt has thus been made to embody in this paper a complete review of the fishes of Alaska to date. The commercial and statistical phases of the fisheries have been fully discussed in reports by Mr. John N. Cobb, assistant agent at the salmon fisheries of Alaska.^a

The following new species are described in this report. The numbers in parentheses are those of the types as registered in the U. S. National Museum.

Polistotrema deani (57820).
Sebastodes swifti (57821).
Icelinus burchani (57822).
Cottus chamberlaini (57823).

Blennicottus clarki (57824).
Pholis gilli (57827).
Lumpenus longirostris (57828).
Lycodes jordani (57829).

Accompanying this report are 20 colored plates, made from water-color drawings of living fishes. Cuts of all the new species herein described are inserted in the text, as are also numerous others.^b

^a The Commercial Fisheries of Alaska in 1905, and The Fisheries of Alaska in 1906, Bureau of Fisheries Documents Nos. 603 and 618.

^b The colored drawings and the pen and ink drawings of all but three of the new species were made by Mr. A. H. Baldwin. *Lumpenus longirostris* and *Polistotrema deani* were drawn by Miss Anna S. Buckelew. *Lycodes jordani* by Miss Violet Dandridge.

GEOGRAPHIC DISTRIBUTION OF FISHES IN ALASKA AND THE PUGET SOUND REGION.

For the purposes of the present paper we have considered the territory covered as made up of five divisions, viz:

1. The Puget Sound-British Columbia region, extending northward to Dixon Entrance and Portland Canal.
2. Southeast Alaska, from Dixon Entrance and Portland Canal to Yakutat Bay.
3. Central Alaska, from Yakutat Bay to the Alaska Peninsula and the Aleutian Islands, including Prince William Sound, Cook Inlet, and their connecting waters.
4. Bering Sea, including the Yukon and all other tributary waters in Alaska.
5. Arctic Ocean, including the Mackenzie and all other tributary waters in Alaska.

The geographic distribution of fishes in these regions is represented in the following tabulation, an examination of which shows some interesting facts. The total number of species recorded is 288. Of these, 7 are found in each of the 5 regions; 40 are known from all of the regions except the Arctic; 16 are known from Bering Sea, Central Alaska, and Southeast Alaska, but not from either of the other 2 regions. Twenty-two are peculiar to Puget Sound region, 15 to Southeast Alaska, 14 to Central Alaska, 55 to Bering Sea, and only 1 (*Argyrosomus lucidus*) to the Arctic. There are 11 anadromous and 18 strictly fresh-water species.

The great number of species from Bering Sea shows how much more thoroughly that region has been studied than have Central and Southeast Alaska; it does not necessarily indicate a decidedly richer fauna.

Family and species.	Puget Sd. and Br. Col. reg.	SE. Alaska.	Cent. Alaska.	Bering Sea.	Arctic Ocean.	Family and species.	Puget Sd. and Br. Col. reg.	SE. Alaska.	Cent. Alaska.	Bering Sea.	Arctic Ocean.
HEPTATREMIDÆ:						SALMONIDÆ—Continued.					
<i>Pollistotrema deani</i>		x				<i>Stenodus mackenzii</i>				x	x
PETROMYZONIDÆ:						<i>Oncorhynchus gorbuscha</i>	x	x	x	x	x
<i>Entosphenus tridentatus</i>		x	x			<i>keta</i>	x	x	x	x	x
<i>Lampetra aurea</i>				x		<i>tschawytscha</i>	x	x	x	x	x
SQUALIDÆ:						<i>kisutch</i>	x	x	x	x	x
<i>Squalus sucklii</i>	x	x	x			<i>nerka</i>	x	x	x	x	x
DALATHIDÆ:						<i>Salmo clarkii</i>	x	x	x	x	x
<i>Somniosus microcephalus</i>		x		x		<i>gairdneri</i>	x	x	x		
SQUATINIDÆ:						<i>iridus</i>	x	x	x		
<i>Squatina squatina</i>		x				<i>Cristivomer nanaycush</i>	x	x	x		
RAJIDÆ:						<i>Salvelinus malma</i>	x	x	x	x	x
<i>Raja binoculata</i>		x	x	x		THYMALLIDÆ:					
<i>parmifera</i>		x	x	x		<i>Thymallus signifer</i>				x	x
<i>aleutica</i>		x	x	x		ARGENTINIDÆ:					
<i>trachura</i>		x	x	x		<i>Mallotus villosus</i>	x	x	x	x	x
<i>abyssicola</i>		x				<i>Thaleichthys pacificus</i>	x	x	x	x	x
CHIMERIDÆ:						<i>Osmerus thaleichthys</i>	x	x	x	x	x
<i>Hydrolagus collii</i>		x	x			<i>dentex</i>	x	x	x	x	x
ACIPENSERIDÆ:						<i>albatrossis</i>	x	x	x	x	x
<i>Acipenser medirostris</i>			x			<i>Hypomesus pretiosus</i>	x	x	x		
CATOSTOMIDÆ:						<i>olidus</i>				x	
<i>Catostomus catostomus</i>						<i>Leuroglossus stibius</i>				x	
SYNAPIBRANCHIDÆ:						MICROSTOMIDÆ:					
<i>Histiobranchus bathybius</i>				x		<i>Bathylagus borealis</i>				x	
NEMICHTHYDÆ:						MYCTOPRIDÆ:					
<i>Avocettina gilli</i>		x				<i>Lampanyctus gemmifer</i>		x			
CLUPEIDÆ:						<i>Nannobranchium leucopsarum</i>				x	
<i>Clupea pallasii</i>		x	x	x		<i>namochir</i>	x	x	x	x	
<i>Alosa sapidissima</i>		x	x	x		<i>Diaphus theta</i>					
SALMONIDÆ:						CHAULIODONTIDÆ:					
<i>Coregonus kennebeci</i>				x	x	<i>Cyclothone microdon</i>				x	
<i>quadrilateralis</i>				x	x	<i>Chauliodus macowi</i>	x	x	x		
<i>nelsoni</i>				x	x	PLAGYODONTIDÆ:					
<i>Argyrosomus pusillus</i>				x	x	<i>Plagyodus asculapinus</i>				x	x
<i>laurette</i>				x	x	<i>borealis</i>				x	x
<i>lucidus</i>				x	x	NOTACANTHIDÆ:					
<i>alascanus</i>				x	x	<i>Macdonaldia challengerii</i>				x	

Family and species.	Puget Isl. and Br. Col. reg.	SE. Alaska.	Cent. Alaska.	Bering Sea.	Arctic Ocean.	Family and species.	Puget Isl. and Br. Col. reg.	SE. Alaska.	Cent. Alaska.	Bering Sea.	Arctic Ocean.
DALLIIDÆ:						COTTIDÆ—Continued.					
Dallia pectoralis.....				X		Enophrys bison.....	X	X			
ESOCIDÆ:						claviger.....					X
Esox lucius.....				X		Ceratocottus diceraus.....			X		X
GASTEROSTEIDÆ:						Cottus asper.....	X	X			
Pygosteus pungitius.....			X	X	X	gulosus.....	X	X			
Gasterosteus cataphractus.....	X	X				cognatus.....				X	X
AULORHYNCHIDÆ:						alenticus.....		X	X		
Aulorhynchus flavidus.....	X	X				chamberlaini.....				X	
SYNGNATHIDÆ:						Myoxocephalus polyacanthocephalus.....	X	X	X		
Siphostoma griseolineatum.....	X	X				jaok.....			X	X	X
AMMODYTIDÆ:						verrucosus.....			X	X	X
Ammodytes personatus.....	X		X	X		axillaris.....			X	X	X
BERYCIDÆ:						stelleri.....				X	X
Plectromus lugubris.....				X		niger.....			X		
cristiceps.....		X				Megalocottus platycephalus.....				X	
ZAPRORIDÆ:						laticeps.....				X	X
Zaprora silenus.....	X					Zesticelus profundorum.....					X
EMBLOTIDÆ:						Thecopterus alenticus.....					X
Cymatogaster aggregatus.....	X	X				Dasycottus setiger.....	X	X	X		
Taeniotoxa lateralis.....	X					Malacocottus zomurus.....		X	X		
Damalichthys argyrosomus.....	X					Porocottus setularis.....				X	
SCORPENIDÆ:						quadrifilis.....				X	
Sebastolobus alascanus.....		X		X		bradfordi.....				X	
altivehs.....		X	X	X		Oncocottus quadricornis.....					X
Sebastodes paucispinis.....	X	X				hexacornis.....			X	X	X
melanoops.....	X	X	X	X		Gymnoceanthus pistilliger.....				X	X
ciliatus.....	X	X	X	X		galentus.....		X	X		X
mystinus.....	X	X	X	X		Leptocottus armatus.....	X	X			
brevispinis.....	X	X	X	X		Ohgocottus maculosus.....	X	X	X	X	
alutus.....	X	X	X	X		Signistes caulis.....				X	
pinniger.....	X	X	X	X		Biennicottus acuticeps.....				X	
aleutianus.....	X	X	X	X		globiceps.....		X			
saxicola.....	X	X	X	X		embryum.....			X	X	
swifti.....	X	X	X	X		clarki.....				X	
diploproa.....	X	X	X	X		Hiisticottus bilobus.....		X	X	X	
intronger.....	X	X	X	X		Blepsias cirrhosus.....	X	X	X	X	
ruberrimus.....	X	X	X	X		Nautiscus pribilofius.....	X	X	X	X	
rosaceus.....	X	X	X	X		Nautichthys oculoasciatus.....				X	
rupestris.....	X	X	X	X		Ulca marmorata.....	X	X			
dalli.....	X	X	X	X		Hemiripiterus cavifrons.....			X	X	
caurinus.....	X	X	X	X		Synchirus gilli.....				X	
maliger.....	X	X	X	X		Psychrolutes paradoxus.....	X	X		X	
nebulosus.....	X	X	X	X		Gilbertidia sigolutes.....		X	X		
nigrocinetus.....	X	X	X	X		RHAMPHOCOTTIDÆ:					
ANOPLOPOMATIDÆ:						Rhamphocottus richardsoni.....	X		X		
Anoplopoma fimbria.....	X	X				AGONIDÆ:					
HEXAGRAMMIDÆ:						Hypsogonus quadricornis.....	X		X	X	
Pleuragrammus monopterygius.....	X	X	X	X		Oca dodecaedron.....				X	
Hexagrammos decagrammus.....	X	X	X	X		Pallasina barbata.....	X	X		X	
octogrammus.....	X	X	X	X		aix.....				X	
stelleri.....	X	X	X	X		Podothecus acipenserinus.....	X	X	X	X	X
supercilius.....	X	X	X	X		Avorruncus emmelane.....	X	X			
lagocephalus.....	X	X	X	X		Sarritor frenatus.....				X	
Ophiodon elongatus.....						leptorhynchus.....				X	
Zaniolepis latipinnis.....						Bathygonus nigripinnis.....	X	X		X	
Oxylebiscus pictus.....	X					Xenochirus pentacanthus.....	X	X		X	
COTTIDÆ:						alascanus.....			X	X	
Chitonotus pugetensis.....						latifrons.....				X	
Tarandichthys filamentosus.....						Odontopyxis trispinosus.....	X	X			
tenuis.....	X					Aspidophoroides guntheri.....				X	
Icelinus burchami.....		X				bartoni.....				X	
borealis.....		X	X	X		inermis.....	X			X	
Astrolytes fenestratus.....	X	X	X	X		CYCLOPTERIDÆ:					
Stelgidinotus latifrons.....	X	X	X	X		Eummicrotremus orbis.....	X				
Arctidellus pacificus.....						Lethrotremus mutinus.....				X	
Rastrinus scutiger.....						Cyclopteroides gyriopus.....				X	
Icelus bicornis.....						Cyclopterichthys ventricosus.....				X	
spiniger.....		X				LIPARIDIDÆ:					
enryops.....		X	X	X		Neoliparis rutteri.....			X		
vicinalis.....		X	X	X		collyodon.....			X		
canaliculatus.....		X	X	X		Liparis cyclopus.....			X	X	
Radulimus asprellus.....	X	X				fucensis.....	X	X			
Triglops beani.....	X	X	X	X		agassizii.....				X	X
septicus.....		X	X	X		herschelii.....				X	X
Sternias xenostethus.....						cyclostigma.....				X	
Prionistius macellus.....			X	X		pulchellus.....		X	X		
Elanura forficata.....			X	X		Crystallichthys mirabilis.....				X	
Melletes papilio.....			X	X		Careproctus sinus.....				X	
Hemilepidotus jordani.....		X	X	X		colletti.....			X		
hemilepidotus.....	X	X	X	X		phasma.....				X	

Family and species.	Puget, Sal. and Br. Col. reg.					Family and species.	Puget, Sal. and Br. Col. reg.				
	SE. Alaska.	Cent. Alaska.	Bering Sea.	Arctic Ocean.			SE. Alaska.	Cent. Alaska.	Bering Sea.	Arctic Ocean.	
LIPARIDID.—Continued.						ZOARCID.—Continued.					
<i>Caroproctus spectrum</i>		X				<i>Lycodes brevipes</i>					X
<i>ostentum</i>						<i>Lycodalepis turneri</i>					X
<i>cetenes</i>						<i>Fircimanus diptera</i>					X
<i>Prognanus cypselurus</i>						<i>Bothrocara pusilla</i>					X
<i>Cyrimedthys mhytrenus</i>						<i>mollis</i>					X
<i>Paraliparis holomelas</i>			X			<i>Gymnelis viridis</i>					X
<i>cephalus</i>						<i>stigma</i>					X
<i>ulochr</i>						<i>Melanostigma pammela</i>					X
<i>Rhinoliparis barbifer</i>						LYCOPODIDÆ					
BATHYMASTERIDÆ						<i>Lycodapus fierasfer</i>					X
<i>Bathymaster signatus</i>						<i>parviceps</i>					X
<i>Ronquilus jordani</i>						<i>extensus</i>					X
TRICHOPOXITIDÆ						MERLUCCIDÆ					
<i>Trichodon trichodon</i>						<i>Merluccius productus</i>					X
<i>Arctoscopus japonicus</i>						GADIDÆ					
BATRACHOIDIDÆ						<i>Boreogadus saida</i>					X
<i>Porichthys notatus</i>						<i>Theragra chalcogramma</i>					X
GORTESIIDÆ						<i>fuscus</i>					X
<i>Caularctus inermifrons</i>						<i>Eleginus navaga</i>		X	X	X	X
BLENIIDÆ						<i>Microgadus proximus</i>		X	X	X	X
<i>Bryostenina polyactcephala</i>						<i>Gadus macrocephalus</i>		X	X	X	X
<i>Apodichthys flavidus</i>						<i>Antimora microlepis</i>					X
<i>Pholis lolicogaster</i>						<i>Lota maculosa</i>					X
<i>fasciatus</i>						MACROURIDÆ					
<i>gilli</i>						<i>Albatrossia pectoralis</i>					X
<i>ornatus</i>		X	X			<i>Bogostovius clarki</i>					X
<i>Anoplarechus atropurpureus</i>						<i>firmisquamis</i>					X
<i>Xiphosus chirus</i>			X			<i>Chalinura serrula</i>					X
<i>Xiphidion mucosum</i>						<i>Macrourus acrolepis</i>					X
<i>rupestre</i>						<i>cinereus</i>					X
<i>Opisthocentrus ocellatus</i>						LEURONECTIDÆ					
<i>Leptoclinus maculatus</i>						<i>Atheresthes stomias</i>					X
<i>Poroclinus rothrockii</i>						<i>Hippoglossus hippoglossus</i>					X
<i>Lumpenus medius</i>						<i>Lyopsetta exilis</i>					X
<i>anguillaris</i>						<i>Opsetta jordani</i>					X
<i>mackayi</i>						<i>Hippoglossoides classodoni</i>					X
<i>fabriei</i>						<i>Psetichthys melanostictus</i>					X
<i>longirostris</i>						<i>Parophrys vetulus</i>					X
<i>Stichæus punctatus</i>						<i>Opsetta ischyra</i>					X
CRYPTACANTHODIDÆ						<i>Isopsetta isolopis</i>					X
<i>Delolepis virgatus</i>						<i>Lepidopsetta bilineata</i>					X
<i>Lycorhynchus aleutensis</i>						<i>Limanda aspera</i>		X	X	X	X
ANARTHIDIDÆ						<i>proboscidea</i>					X
<i>Anarthichas lepturus</i>						<i>Pleuronectes quadrituberculat</i>					X
PRILICHTHYIDÆ						<i>Liopsetta glacialis</i>					X
<i>Prilichthys goodii</i>						<i>Platichthys stellatus</i>					X
ZOARCIDÆ						<i>Microstomus pacificus</i>					X
<i>Lyciscus crotalinus</i>						<i>Glyptocephalus zachirus</i>		X	X	X	X
<i>Lycodopsis pacificus</i>		X	X	X		<i>Citharichthys sordidus</i>					X
<i>Lycodes concolor</i>						<i>stigmaeus</i>		X			X
<i>digitatus</i>											X
<i>palearis</i>			X	X	X						X
<i>jordani</i>			X								X
						Total	119	134	149	189	36

Family 1. HEPTATREMIDÆ. The Borers, or Hagfishes.

1. *Polistotrema deani* Evermann & Goldsborough, new species.

Head to first gill-opening 6.5 in total length; depth 13.6; tail 7; branchial distance 7.3; gill-openings 11 or 12; teeth 11 + 11 and 10 + 10; base of tongue under third gill-opening.

Body long and slender, little compressed; head somewhat depressed; nostril broad, slit-like, terminal; mouth a longitudinal slit with wrinkled edges; 8 barbels, 4 above and 4 below; apparently no anterior rudimentary gill-slits. Fin-fold well pronounced on ventral surface of body, gradually disappearing in front of middle of length; caudal rounded, showing ray-like marks.

Color purplish-blue or that of the Santa Clara prune, becoming blacker in alcohol, and uniform over the whole body; ventral fold or anal fin not bordered by white; no white border about gill-openings.

This species differs from *Polistotrema stouti* in a number of important respects, chief of which are the much shorter head (6.5 instead of 4.5 in body), the longer tail (7 instead of 8), the more numerous

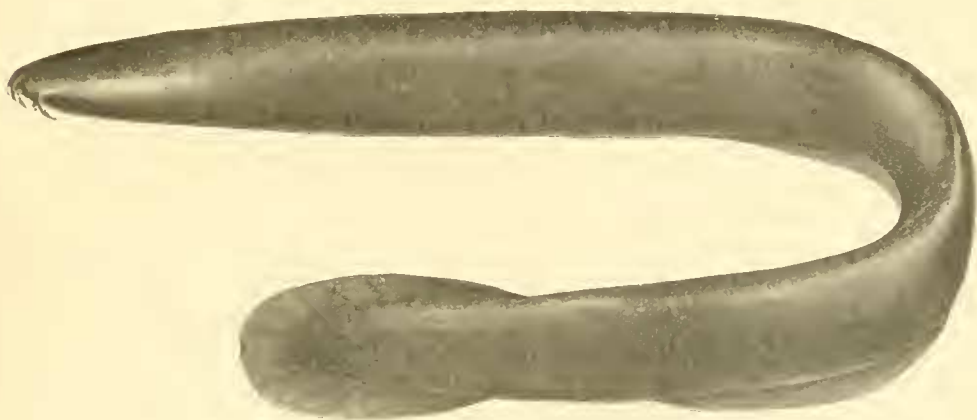


FIG. 1.—*Polistotrema deani* Evermann & Goldsborough, new species. Type.

teeth, and the color. In *P. stouti* the ground color of fresh specimens^a was brown plus a little pink, which changes to a bluish tint in preserved specimens; ventral fold or anal fin bordered by white, which often encircles the caudal fin; gill-openings bordered by white ring; old examples often mottled or blotched about the head with white; a few specimens had in addition 1 or 2 black blotches on the side of the body.

In the following table are given certain comparative measurements of 97 examples of *P. stouti*,^a and corresponding measurements of our 4 specimens of *P. deani*. All measurements, etc., were taken from the right side of fresh hags that had just died. The specimens were laid flat on a board, but none was stretched. In two of the specimens of *P. deani* the left side was used, as being more satisfactory. All measurements are in millimeters, from which proportional measurements can be readily computed.

^a From Monterey Bay and examined for us by Mr. William F. Allen, at the Hopkins Seaside Laboratory.

COMPARATIVE MEASUREMENTS OF *POLISTOTREMA STOUTI* AND *P. DEANI*.*Polistotrema stouti*.

No. of specimen.	Tip of snout to tip of tail. ^a	Tip of snout to center of first gill opening.	Center of first gill opening to center of last.	Number of branchial openings.	No. of specimen.	Tip of snout to tip of tail. ^a	Tip of snout to center of first gill opening.	Center of first gill opening to center of last.	Number of branchial openings.
	mm.	mm.	mm.	mm.		mm.	mm.	mm.	mm.
1	550	130	64	12	50	130	106	54	11
2	415	115	60	12	51	181	124	60	12
3	102	97	53	12	52	475	115	63	12
4	555	127	73	12	53	464	114	60	12
5	582	135	73	13	54	503	122	64	12
6	540	122	68	12	55	426	94	60	12
7	190	111	63	12	56	412	104	58	11
8	482	112	68	12	57	490	118	61	12
9	512	116	70	12	58	355	89	42	11
10	475	111	65	12	59	180	125	57	11
11	458	113	61	12	60	472	110	65	12
12	415	92	57	13	61	386	92	53	11
13	511	114	72	12	62	390	93	48	12
14	412	91	56	11	63	410	111	57	12
15	477	112	67	12	64	510	122	68	12
16	494	116	65	12	65	503	120	72	12
17	503	118	65	11	66	485	113	60	12
18	468	116	60	12	67	412	105	51	11
19	512	130	64	11	68	486	116	70	13
20	458	112	53	11	69	465	114	68	12
21	160	109	63	12	70	460	112	64	12
22	488	117	64	12	71	467	114	61	12
23	482	115	63	12	72	440	110	66	12
24	173	118	59	12	73	512	125	65	12
25	470	118	63	12	74	378	95	46	12
26	490	123	64	12	75	438	103	66	12
27	422	117	53	11	76	460	127	57	12
28	470	118	61	11	77	436	110	53	11
29	410	97	53	12	78	370	90	48	11
30	473	117	63	11	79	383	95	50	12
31	486	120	54	11	80	438	110	59	11
32	470	110	62	11	81	550	131	74	12
33	403	91	49	12	82	473	109	66	12
34	462	110	58	13	83	478	114	63	11
35	440	115	58	12	84	427	100	57	11
36	433	112	57	13	85	492	119	72	12
37	458	111	61	12	86	430	105	58	12
38	485	122	65	12	87	486	116	67	11
39	482	120	58	12	88	545	125	74	11
40	463	116	55	12	89	510	116	66	12
41	492	120	68	12	90	488	123	69	12
42	510	129	63	11	91	476	112	60	11
43	473	109	60	12	92	482	118	64	12
44	458	108	55	12	93	440	109	54	11
45	519	124	62	12	94	444	112	68	12
46	473	116	63	12	95	413	98	56	12
47	582	137	71	11	96	412	98	57	12
48	480	110	75	12	97	463	120	68	12
49	434	108	58	11					

Polistotrema deani.

2866	485	83	79	{ 11 left.	2877	640	97	84	{ 11 right.
2867	520	86	73	{ 11 left.	2880	470	87	67	{ 11 right.

^a Not including tentacles.

Polistotrema deani is known from 4 specimens, all in rather poor condition: Two, no. 2866 and 2867, 19 and 21 inches long, respectively, dredged by the *Albatross* in 1903, in 130 to 193 fathoms at station 4235, in Spacious Bay, Cleveland Peninsula, Alaska; and two, no. 2877 and 2880, 24.5 and 18.5 inches long, dredged on same date in 229 to 231 fathoms at station 4238, in Behm Canal off Nose Point.

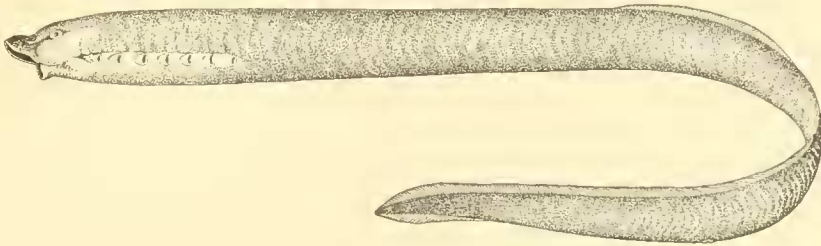
Type no. 57820 U. S. National Museum (field no. 2880), Albatross station 4238 in Behm Canal off Nose Point, in 229 to 231 fathoms. The three other specimens are cotypes, of which two are deposited in the U. S. National Museum and one in the Museum of Stanford University.

We take great pleasure in naming this interesting species for Prof. Bashford Dean, of Columbia University, in recognition of his excellent work "On the Embryology of *Bdellostoma stouti*."

Family 2. PETROMYZONIDÆ. The Lampreys.

2. *Entosphenus tridentatus* (Gairdner).

Four specimens 16 to 18 inches long, collected by Mr. Chamberlain in Naha River near Loring, June 23, 1903, and a 6-inch specimen seined by him in McDonald Lake, August 24, 1905. Mr. Chamberlain reports that lampreys were quite abundant June 22 at the foot of Dorr Falls in Naha stream. More than 50 were observed attached to the rocks. They were first noticed June 20 and all had dis-

FIG. 2.—*Entosphenus tridentatus* (Gairdner).

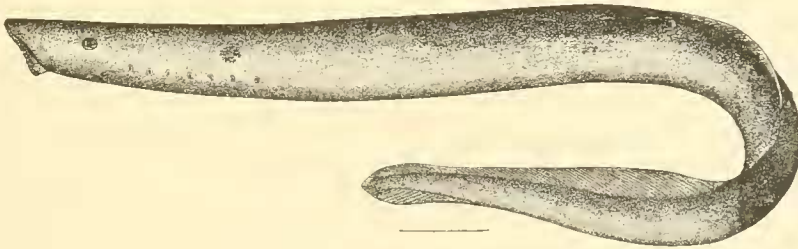
appeared in a week or ten days. Five males and 5 females were examined. Of the latter all but one appeared to have done spawning, and it is believed they were there for spawning purposes.

At the Yes Bay hatchery a number of young were caught in the flume which brings water to the hatchery from a point on the creek below the falls. It is believed that the lamprey spawns among the rocks at the foot of that falls.

This species was recorded at Unalaska, by Gilbert in 1895.

3. *Lampetra aurea* (Bean). *Lamprey Eel*.

This species, originally described from Anvik, Yukon River, and recorded from Fort Yukon by Bean in 1882 as *Ammocatus aureus*, was not seen by us. Recorded from Mission, Yukon River (Nelson 1887), as *Ammocatus aureus*.

FIG. 3.—*Lampetra aurea* (Bean).

Mr. V. L. Derby, formerly a school-teacher at St. Michael and Point Barrow, in a letter dated January 19, 1907, furnishes the following interesting note on this species:

In the spring—I believe during the month of April—the eels start up the river in one large school, presumably to spawn. I am not enlightened upon this point, but suspect they live in the salt water through the greater portion of the year and as spawning season draws near they enter the fresh water streams. I am in the dark whether they are found in other streams in Alaska besides the Yukon.

As the time approaches for the arrival of the "snaky" forms, the Indians keep close watch for the first arrivals. Remember that the great river is covered with ice from 4 to 5 feet in thickness at this time of the year, and it is no small task for the young boys to keep a number of large holes open and occasionally dipping with their large dip nets. These nets are also used by the natives to catch salmon during the running season. Saw several Indians in their kyaks using their dip nets, but during the short time I was in sight of them aboard the United States transport did not have the pleasure of seeing a fish caught.

When the eels are reported as having come, the whole village—men, women, and children—go out quickly and gather in a harvest of these fish while the school is passing, and when the rear guard has

safely eluded the last net an Indian boy, swift on foot, is sent to apprise the villagers above of the coming eels, and so on, all the way up the river.

In the "cut" there looks to be some 15 or 20 bushels of frozen eels. I understand these eels are exceedingly oily, and if the oil were clarified would make a good oil for painting purposes.

The Indians catch these eels mostly for dog food, but do eat them only when there is a scarcity of other foods, as they are much stronger flavored than the eels we have in the fresh water streams in the States.

Family 3. SQUALIDÆ. The Dogfishes.

4. *Squalus sucklii* (Girard). *Dogfish*.

Specimens were secured in gill nets or seine at Nanaimo, Fort Rupert, Union Bay, and Diamond Point; others were taken on hook and line at Loring, Cleveland Passage, and a single specimen (field no. 3018), 29 inches long, was taken over the rail of the ship at Klawock. A female taken on hook and line in Cleveland Passage was 44 inches long, weighed 17 pounds, and contained 14 very active young. Each was about 7.5 inches long, and the yolk sac was very large. Another specimen was taken on hook and line at Shakan and one at Port McArthur.

Those taken at Nanaimo were secured June 20 in a 5½-inch mesh gill net set at the surface on the south side of the outer harbor. They were four in number, each about 3 feet long, all females with 4, 6, 9, and 9 embryos, respectively. The embryos in those having 9 were each about 9 inches long, those in the other two were only about 1.5 inches long. Spots on the larger embryos were very plain; no pigment developed in the smaller ones, except in the eyes.

The dogfish is apparently common throughout Southeast Alaska, where, as elsewhere, it is regarded with disfavor. At Loring considerable numbers are caught for the oil that is tried out of the liver. They are taken by means of a gaff hook as they come about the cannery to feed upon the oil.

This species has been recorded (as *Squalus acanthias*) by Bean (1882) from Sitka; Port Althorp; Marmot Island; and Red Bay.

Family 4. SOMNIOSIDÆ. The Sleeper Sharks.

5. *Somniosus microcephalus* (Bloch). *Sleeper Shark*.

Two dead examples were seen July 13, 1903, on a mud flat at the Point Highfield cannery, where they had been left by the tide. One lying near shore was a female 11 feet long. Skin covered with short, stiff, hair-like prickles. Examined for its fetuses, but none found. On the evening of July 14, at Sunny Bay, Taku Inlet, 2 examples were caught over the rail of the steamer. One took the bait, the other was accidentally hooked in the tail. The latter was a female and gave the following measurements:

Total length 8 feet 2 inches; length of snout to middle of eye 10 inches, to first gill opening 20 inches, to last gill opening 25 inches, to base of pectoral 28 inches, to origin of first dorsal 50 inches, to spiracle 13.5 inches, diameter of eye 1.5 inches; distance from front of first dorsal to second dorsal 24 inches, from front of second dorsal to base of caudal 16 inches; length of upper caudal lobe 17.5 inches, lower caudal lobe 13 inches; length of gill slit 3.75 inches; posterior height of second dorsal 6 inches, base 4.5 inches; posterior height of first dorsal 5 inches, base 5 inches; length of pectoral 11 inches, base 13.5 inches; height of ventral 5 inches, base 5.5 inches; girth at base of pectoral 51 inches; greatest girth at upper base of pectoral 52 inches; greatest girth of tail 16 inches, least girth 12.25 inches. Total weight 381 pounds, liver 48 pounds. Ovaries very immature; gall 24 ounces. Axil to axil over back 28 inches. Color sooty black, a little mottled.

Also recorded from Hassler Harbor (Bean 1884) and St. Michael (Turner 1886). Mr. A. B. Alexander informs us that the *Albatross* has taken examples on trawls at various places in Alaska.

Family 5. SQUATINIDÆ. The Angel Sharks.

6. *Squatina squatina* (Linnaeus).

One specimen, a female 14 inches long. The locality label has been lost.

Family 6. RAJIDÆ. The Rays and Skates.

7. *Raja binoculata* Girard. *Big California Skate*.

Common. The collection contains the following specimens: No. 2896, a male 10 inches long, from station 4248, in Eastern Passage near Wrangell; no. 2748, a small male seined at Klawock; no. 2837; no. 2839, a female; no. 2841, a female 21 inches long, from Puget Sound near Port Townsend; no. 2871, a female; six specimens 6 to 13 inches long collected in Puget Sound by Mr. Todd; one (no. 1272) 15.5 inches long dredged by the *Albatross* August 28, 1891, at station 3450, off Washington. Other specimens were dredged at stations 4211, 4214, 4219, 4233, 4192, and in Kilisnoo Harbor; examples were seen also at Port Townsend, Nanaimo, Karta Bay, Yes Bay, and Dundas Bay. Two very large examples were examined at a salmon trap. Both were females, on which the following notes were made:

	First example	Second example
Total length.....inches.	56 0	51.00
Length of disk.....do.	36 5	33.25
Width of disk.....do.	39.5	35.00
Tip of snout to angle of pectoral.....do.	30 0	24.00
Tip of pectoral to base of tail.....do.	24 5	23.00
Weight.....pounds.	48 0	32.00

Mr. Bell, superintendent of the Dundas Bay cannery, says rays are often taken in the salmon traps, some much larger than these.

At Kilisnoo Harbor, July 1, two egg capsules were dredged. One was empty, but the other contained 4 eggs, each about the size of a hen's egg. The attached embryos were long (each about 3 inches), slender and very squirmy.

No. 2896 is described as follows: Length of disk 1.4 in width; tail 1.3 in length of disk; anterior edge of pectoral scarcely less than length of disk, one-half greater than posterior edge; snout 3 in length of disk; interorbital width 2.5 in snout; width of mouth equalling interorbital width; disk much broader than long; anterior margin of pectoral nearly straight, scarcely or not at all convex, the 2 margins forming an angle of 95 to 98 degrees; tip of snout not produced, nor differentiated from general outline; posterior margin of pectoral gently convex, forming an angle of about 90 degrees with the anterior margin. Three sharp spines about the eye, 2 in front, the third above and posterior; one strong spine on median line of back, midway between nostrils and humeral region; tail with a series of 14 stout prickles beginning at base and extending to first dorsal fin; one small spine between the 2 dorsals; upper part otherwise entirely smooth and without prickles of any kind; under parts entirely smooth.

Color light brown; a large black spot equal to twice longest diameter of eye at base of pectoral, surrounded by a broad ring of reddish brown, which in turn is surrounded by a nearly equally broad black ring; the total diameter of the ocellated spot slightly exceeding the inter-spiracle width; an obscure brownish spot behind the large ocellated spot slightly greater than eye in diameter; back profusely covered with small irregularly placed paler spots, those on posterior margin of pectoral oblong.

From typical *R. binoculata* this specimen differs in the less projecting snout, the coloration, and the spines. The large spot at the base of the pectoral is that of *R. stellulata*, but the prickles are less evident.

An examination of our material shows that the males differ from the females in having the snout blunter and less produced and the pectoral ocellus much larger and more distinct. It is also evident that the prickles become more numerous with age. As these variations cover all the differences in characters assigned to the 3 nominal species *R. binoculata* Girard, *R. rhina* Jordan & Gilbert, and *R. stellulata* Jordan & Gilbert, we are compelled to regard the three as one species. We have compared our specimens with the types of *R. rhina* and *R. stellulata*.

Recorded by Bean (1882), as *Raja binoculata*, from the following localities: Sitka; Port Althorp; St. Paul, Kodiak Island; and Wrangell. By Gilbert (1895) as *Raja stellulata*, from Unimak Pass, Bristol Bay, and along the northern shores of Unalaska Island at stations 3217, 3255, 3258, 3310, and 3312.

Raja binoculata Girard, Proc. Ac. Nat. Sci. Phila. 1854, 196, San Francisco.

Raja cooperi Girard, Pac. R. R. Surv., 372, 1858, Shoalwater Bay, Washington.

Raja stellulata Jordan & Gilbert, Proc. U. S. Nat. Mus. 1880, 133, Monterey.

Raja rhina Jordan & Gilbert, Proc. U. S. Nat. Mus. 1880, 251, Monterey and San Francisco.

8. *Raja parmifera* Bean.

One specimen (no. 2904) 7 inches long, and 4 eggs, dredged at station 4252, in Frederick Sound; another (no. 3001) 23 inches long, at station 4291, in Shelikof Strait; one (no. 3005) 21 inches long, at station 4295, in Shelikof Strait; two from station 4280, in Chignik Bay; and two from Alitak Bay. The latter were both males, and furnished the following notes: First example, length of disk 21 inches; width 24; length of tail 20; snout to angle of pectoral 18; tip of snout to eye 7.5; weight 14 pounds. Second example, length of disk 28 inches; width 31; tail 24; snout to angle of pectoral 22; tip of snout to eye 9.5; weight 25 pounds. Thirty to 33 spines on median line of back and tail; no marginal row of larger spines on tail in female; spines on back more numerous and smaller in female; male with two large humeral spines, female with one; supraoccipital crest more developed in the male.

Originally described by Bean (1882) from Hiuliuk, Unalaska. Gilbert (1895) records it from Albatross stations 3252, 3259, 3267, 3270, 3272, 3281, 3282, 3292, 3293, 3310, and 3313, all in Bristol Bay.

9. *Raja aleutica* Gilbert.

No. 1775 (1726), a specimen 33 inches long, collected at station 3602.

Dorsal and caudal fins covered with small prickles; 4 large spines in shoulder region on median line; after a slight interspace 32 additional spines on median line of back and tail, 2 of the latter being between the dorsals. The spines are large anteriorly, becoming smaller to the root of the tail, thence larger, as large as the anterior ones for half length of tail, whence they grow gradually smaller to tip of tail. Teeth quite sharp, conical; lateral edges of upper lip fringed; back with small prickles everywhere, except an area below and behind eyes to below shoulder region, and the edges of pectoral laterally and posteriorly; a row of pores, with short tubes, on each side and just below the first median spine, these diverging toward each eye, running half the distance from spine to eye, the area about them being free from prickles; a similar row of pores around the entire margin of the disk and also on each side of the nasal cartilage; lateral and posterior angles of disk broadly rounded, margin between these angles gently rounded.

Originally described by Gilbert (1895) from station 3257, north of Sannak Pass, Aleutian Islands.

10. *Raja trachura* Gilbert.

Recorded by Gilbert (1895) from station 3338, south of the Shumagin Islands. Not seen by us.

11. *Raja abyssicola* Gilbert.

Originally described from Albatross station 3342, off Queen Charlotte Island, in 1,588 fathoms.

Family 7. CHIMÆRIDÆ. The Chimæras.**12. *Hydrolagus collicii* (Lay & Bennett). *Ratfish*.**

Common. Specimens were caught in gillnet at Nanaimo; one was seined at Port Alexander, and others were dredged at stations 4191, 4197, 4201, 4215, 4216, 4218, 4219, 4221, 4223, and 4246. Seven

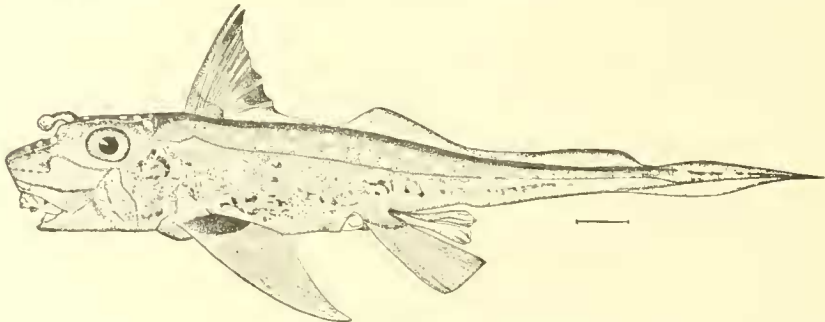


FIG. 4.—*Hydrolagus collicii* (Lay & Bennett).

specimens examined are 4.5 to 12 inches long. We have examined another example (no. 2442) 13.5 inches long, dredged by the Albatross April 30, 1901, at station 3790, off Tatoosh Island Light, in 122 fathoms. In this specimen the caudal is produced into a decided filament.

Recorded from Alaska and Alexander Archipelago as *Chumara collicii* (Bean 1882).

Family 8. ACIPENSERIDÆ. The Sturgeons.

13. *Acipenser medirostris* Ayres. *Green Sturgeon*.

According to Mr. J. F. Williams, of Chignik Bay, 2 green sturgeon were caught some years ago (1897) in the Copper River. Each was about 4 feet long. We were told of one seen in the Columbia River which weighed 900 pounds.

It is said that years ago San Francisco restaurants served sturgeon steaks as sea bass or sole.

Family 9. CATOSTOMIDÆ. The Suckers.

14. *Catostomus catostomus* (Forster). *Long-nosed Sucker*; *Northern Sucker*.

Very abundant in Watson River, near Caribou, Yukon Territory, where 76 specimens 4 to 10.5 inches long were seined July 18 and 19.

Head 4.2; depth 5.5; eye 6; snout 2.2; dorsal 10; anal 7; scales 20-110 to 120-15 to 17, 60 to 65 in front of dorsal; length of pectoral 1.25 in head; ventral 1.6; height of dorsal 1.5. Color in life, mottled olive; belly somewhat silvery; head brassy; fins all dull orange, the dorsal darker at tip.

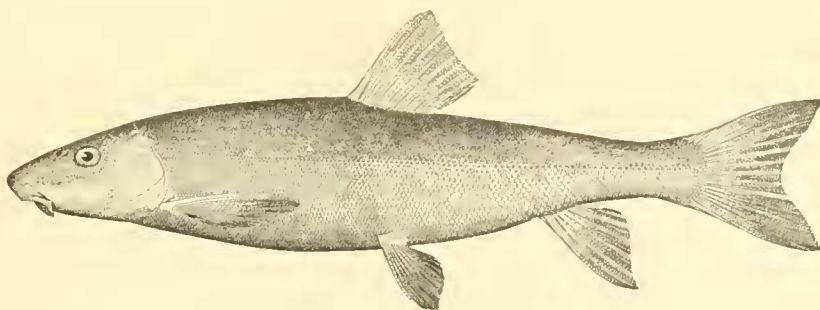


FIG. 5.—*Catostomus catostomus* (Forster).

Compared with specimens from Clear Creek, near Clearmont, Wyo., the Caribou specimens have considerably smaller scales (the Wyoming specimens having only 90 to 100 in course of lateral line), and more pointed head, with longer snout.

This species has a wider distribution than any other member of the family. It was described originally from the Hudson Bay region, and has since been recorded from various localities from New England westward to the headwaters of the Missouri and the Columbia and northward to Alaska. It is doubtless abundant in all suitable waters from the Hudson Bay region west and northwestward. At Great Slave Lake, on the Yukon, and elsewhere, it is a food fish of considerable importance, especially to the Indians. An examination of numerous specimens in the present collection indicates that the spawning season at Caribou is entirely over by July 19.

Recorded from Nulato, Yukon River, as *Catostomus longirostris* (Bean 1882). Upper Kobuk River (Townsend 1887). Nulato and Andreafski, Yukon River, and streams flowing into Kotzebue Sound (Turner 1886).

Cyprinus catostomus Forster, Philos. Trans. for 1773, 155, streams about Hudson Bay.

Catostomus longirostrum Le Sueur, Jour. Ac. Nat. Sci. Phila. 1817, 102, Vermont.

Catostomus hudsonius Le Sueur, Jour. Ac. Nat. Sci. Phila. 1817, 107, Vermont. Günther, Cat., VII, 13, 1868.

Catostomus forsterianus Richardson, Franklin's Journal 1823, 720, Lake Huron and Great Slave Lake.

Catostomus aurora Agassiz, Lake Superior, 360, figs. 3 and 4, 1850, The Pic, Lake Superior.

Catostomus longirostris, Jordan, Bull. U. S. Nat. Mus., XII, 175, 1878 (Nulato, Yukon River; St. Michael's, Alaska).

Catostomus nanomyzon Mather, Twelfth Rept. N. Y. Fish Comm. 1884, 36, Big Moose Lake, Northern New York.

Family 10. SYNAPHOBRANCHIDÆ.

15. *Histiobranchus bathybius* (Günther).

One specimen reported by Dr. Gilbert from Bering Sea in 1895 at Albatross station, 3308.

Family II. NEMICHTHYIDÆ. The Snipe Eels.

16. *Avocettina gilli* (Bean).

Originally described from Albatross station 2859, east of Prince of Wales Island, in 1,569 fathoms. Only the type known.

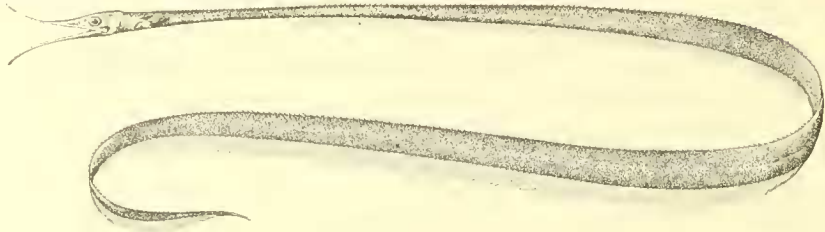


FIG. 6.—*Avocettina gilli* (Bean).

Family 12. CLUPEIDÆ. The Herrings.

17. *Clupea pallasii* Cuvier & Valenciennes. *California Herring*.

The collection contains 64 specimens 2 to 12.5 inches long, from Loring, Marrowstone Point, Kilisut Harbor, Admiralty Head, Pablof Harbor, Litnik Bay, Cleveland Passage, Port Alexander, and Karluk; Sitka, collected by Mr. Luttrell in September, 1893; Unalaska, July 2, 1900; Killisnoo, August 21, 1900; Pyramid Harbor, August 23, 1900; Utsalady, Washington, October 2, 1895; Cordova Bay, Prince of Wales Island, in 1897; Litnik Bay, August 15, 1900, and Petropaulski, June 20, 1900.

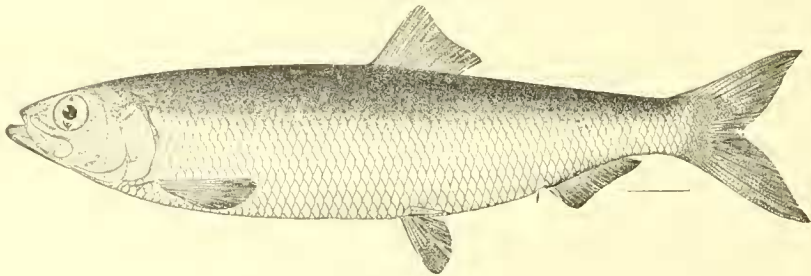


FIG. 7.—*Clupea pallasii* Cuvier & Valenciennes.

In the seining operations this species was found in abundance at Port Alexander, Kilisut Harbor, Marrowstone Point (the examples all young), Uyak Bay (adults), Litnik Bay (adults), and Cleveland Passage (many young, 5 inches long).

It is said to be abundant in Chilkoot Inlet in April and May. Seventy-one examples taken at Uyak Bay weighed 47.75 pounds, the average weight being therefore 10.76 ounces. The average length was 11.67 inches. The individual weights and lengths are given in the following table:

INDIVIDUAL LENGTHS AND WEIGHTS OF SEVENTY-ONE PACIFIC HERRING (*CLUPEA PALLASII*), TAKEN AT UYAK BAY, ALASKA, AUGUST 4, 1903.

Specimen.	Length.	Weight.	Specimen.	Length.	Weight.	Specimen.	Length.	Weight.
	<i>Inches.</i>	<i>Ounces.</i>		<i>Inches.</i>	<i>Ounces.</i>		<i>Inches.</i>	<i>Ounces.</i>
1.....	13.5	12.0	25.....	13.0	12.5	49.....	12.0	9.0
2.....	13.0	12.0	26.....	12.0	9.5	50.....	12.0	9.0
3.....	13.0	12.0	27.....	12.5	11.0	51.....	12.0	8.5
4.....	12.0	10.5	28.....	13.0	13.0	52.....	12.5	10.5
5.....	12.0	10.5	29.....	13.5	14.0	53.....	11.0	7.0
6.....	12.5	12.5	30.....	13.5	13.5	54.....	12.5	12.0
7.....	13.5	12.5	31.....	14.0	14.0	55.....	12.0	9.0
8.....	10.5	5.5	32.....	14.0	14.0	56.....	13.5	13.0
9.....	14.0	13.5	33.....	13.5	12.0	57.....	11.0	7.0
10.....	12.5	12.5	34.....	13.5	12.5	58.....	13.0	11.5
11.....	13.0	11.5	35.....	12.5	10.0	59.....	12.0	8.5
12.....	13.0	12.5	36.....	12.5	10.0	60.....	13.5	12.5
13.....	13.5	13.5	37.....	13.5	12.0	61.....	12.0	9.5
14.....	13.5	13.5	38.....	13.5	12.0	62.....	12.5	9.5
15.....	13.5	12.5	39.....	13.5	13.5	63.....	11.0	7.5
16.....	13.5	14.5	40.....	12.5	10.0	64.....	12.0	9.0
17.....	13.0	10.5	41.....	14.0	13.5	65.....	12.0	8.0
18.....	13.0	11.5	42.....	13.0	10.5	66.....	13.0	13.5
19.....	13.0	11.5	43.....	12.0	9.0	67.....	12.5	8.5
20.....	13.0	12.5	44.....	13.0	11.5	68.....	12.0	8.5
21.....	13.5	13.0	45.....	11.5	10.0	69.....	10.0	5.0
22.....	12.5	10.5	46.....	12.5	11.0	70.....	10.0	6.0
23.....	13.5	15.0	47.....	12.5	10.5			
24.....	11.5	8.0	48.....	11.5	8.0			

The herring is now a fish of considerable and growing importance in Southeast Alaska. It is salted to some extent at certain of the salmon canneries, and when so prepared is an excellent article of food. For a number of years great quantities have been used for oil and fertilizer at Killisnoo. Recently it has come to be in great demand as bait in the halibut fisheries.

According to Mr. Cobb^a, this fish is said to spawn in southeast Alaska in May to July. The grounds are widely distributed from Howkan to Skagway and through Icy Straits to Cross Sound. After spawning the fish are said to school out in the deeper water of Frederick Sound and Stephens Passage, and later reenter the bays to feed. During July and August they are filled with "red feed," and are then very difficult to cure. In September and October their food seems to change and they are then in prime condition. The runs are usually composed of mixed sizes, although in early summer the sizes are said to be uniformly small in some places.

The herring is one of the chief articles of food of the king salmon in the winter and spring in certain parts of Alaska, particularly about Killisnoo, Chilkoot Inlet, and Ketchikan. This was observed during an unusual run of king salmon, which began about the middle of January, 1905, and continued until May 18. There is usually a large run of herring in Chilkoot Inlet early in the spring.

Recorded by Bean (1884) from Sitka; Old Sitka; Port Althorp; Port Mulgrave; Chugachik Bay, Cook Inlet; Niuliuk, Unalaska; St. Michael; and Port Clarence; and (1882) Wrangell. Unalaska and Herendeen Bay (Gilbert 1895). St. Michael; Unalaska Harbor, and Norton Sound (Nelson 1887). Port Clarence (Scofield 1899).

^a Fisheries of Alaska in 1906, Bureau of Fisheries Document 618, p. 52, 1907.

18. *Alosa sapidissima* (Wilson). *Atlantic Shad*.

The shad has extended its range far northward. The cannery at Fairhaven took one about July 1, 1903, and the fishermen at Birch Point got about 3,000 in one day. The species has been reported from Stikine River and in 1904 it was taken at Kasilof, on Cook Inlet.

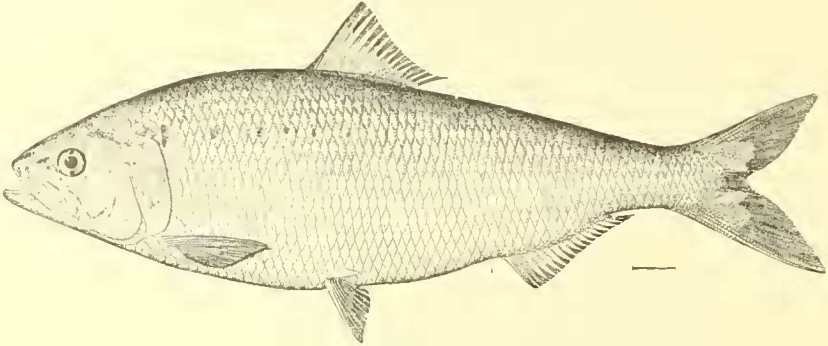


FIG. 8.—*Alosa sapidissima* (Wilson).

Family 13. SALMONIDÆ. The Salmon, Trout, and Whitefishes.

19. *Coregonus kennicotti* Milner. *Kennicott's Whitefish*.

Two specimens, 6 and 6.25 inches long, were secured at Lake Bennett.

Scales 13-76 to 82-8; gillrakers 5+14 (right), 7+12 (left), rather long and slender, somewhat blunt tipped, but firmer than in *C. quadrilateralis*, their length about diameter of pupil.

This species may be readily distinguished from the round whitefish found in the same waters by the somewhat larger mouth, longer and more numerous gillrakers, larger and much more caducous scales, and more elevated back.

This species of whitefish is probably common in Lake Bennett, Tagish Arm, Lake Atlin, and other headwaters of the Yukon. It has been previously recorded from Alaskan localities as follows: Yukon River at Nulato and St. Michael (Bean 1882), Middle Kobuk River (Townsend 1887), rivers about Point Barrow (Murdoch 1885), St. Michael (Nelson 1887), and Barter Island near the mouth of the Mackenzie River (Schofield 1899).

20. *Coregonus quadrilateralis* Richardson. *Round Whitefish*.

Twenty-five specimens, 3.75 to 11.5 inches long, seined in Lake Bennett, and 4 at Caribou Crossing. Scales 10-95 to 100-8; gillrakers very short and weak, about 7+10.

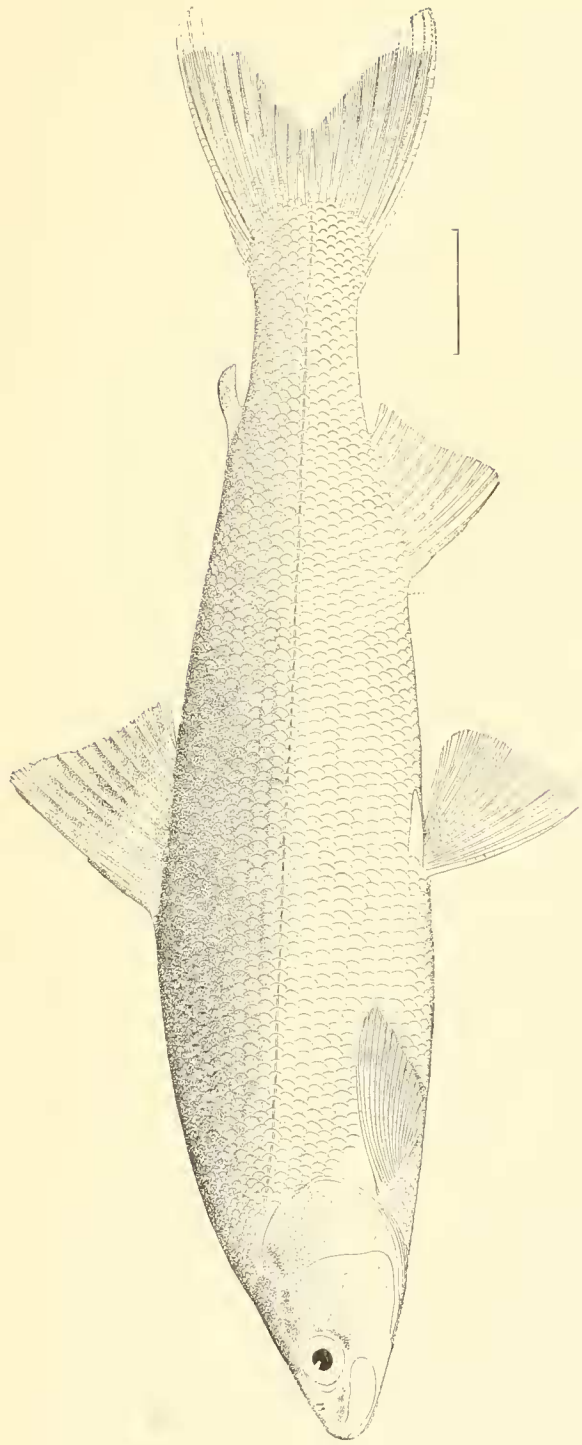
This is apparently the most abundant species of whitefish in the headwaters of the Yukon. The young were very abundant in Lake Bennett, where many examples were seined in shallow water. It appeared to be less common at Caribou Crossing.

One large example was obtained, August 5, by Dr. Gilbert in Wood River at the upper trap. Gillrakers 6+8 and 8+10, short, blunt, and weak; scales 10-101-8.

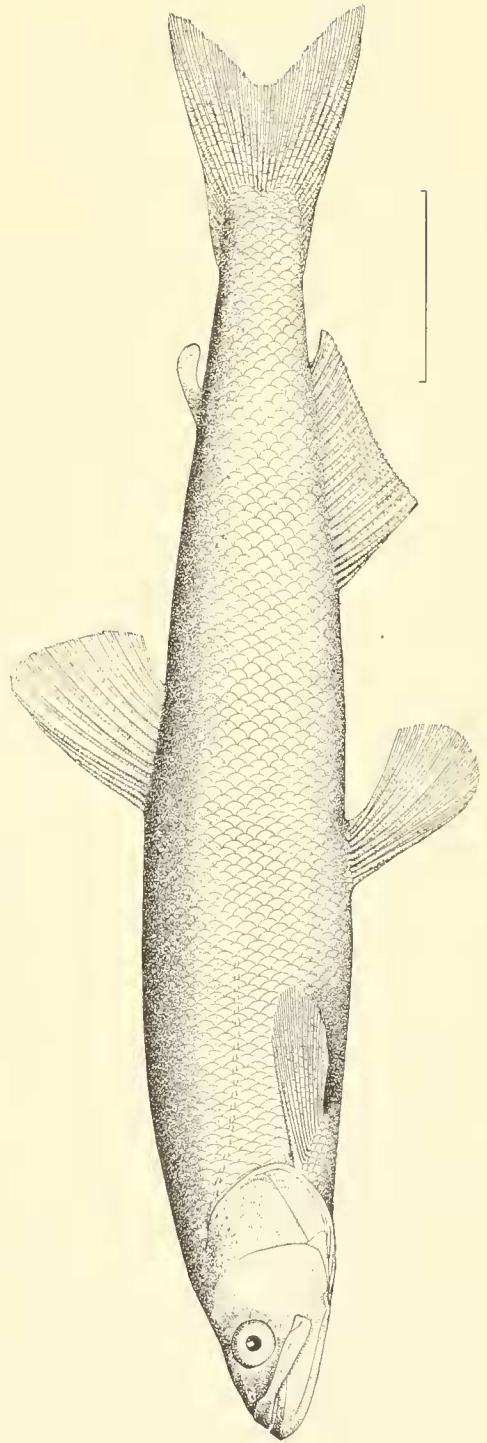
Color in life, light olive; scales darker edged, sides silvery; 13 diffuse, roundish, dusky blue spots along lateral line and 2 or 3 above it posteriorly; vestiges of parr-marks; upper fins very slightly reddish olive, lower bright creamy orange; opercle and shoulder bar creamy orange.

At Caribou Crossing this whitefish is of considerable importance as a food fish. The principal supply is said to come from Lake Atlin, where it is caught in winter as well as at other seasons. It is doubtless common in all suitable waters in the Yukon Basin.

This species has previously been recorded from the following Alaskan localities: Yukon River at Nulato and Fort Yukon (Bean 1882); Yukon River at Nulato and Unalakleet River (Nelson 1887); and Yukon River at Fort Yukon (Turner 1886).



1. ARGYROSOMIUS ALASCANUS SCOFIELD. TYPE.



2. OSMERUS ALBATROSSIS JORDAN & GILBERT. TYPE.

21. *Coregonus nelsoni* Bean. *Nelson's Whitefish.*

We have a single specimen, no. 2927, 12 inches long, collected in Lake Bennett, British Columbia, July 20, 1903.

Originally described by Bean (1884) from Nulato, and since recorded from Middle Kobuk River (Townsend 1887), Point Barrow (Murdoch 1885), Nulato and Andreafski, Yukon River (Nelson 1887), and Grantley Harbor (Scofield 1899).

22. *Argyrosomus pusillus* (Bean). *Least Whitefish.*

Six specimens, 9.75 to 10.5 inches long, obtained at Caribou Crossing, and 8 specimens, 4.5 to 10 inches long, seined in Lake Bennett. The 4.5-inch Lake Bennett specimen is described as follows:

Head 4.67 in body; depth 5.5; eye 3.75 in head; dorsal 10; anal 12; ventral 11; scales 10-90-8.

Body rather elongate, compressed; mouth oblique, gape rather small, extending back about half the length of the maxillaries; lower jaw considerably projecting; maxillary broad, somewhat curved, not extending much beyond the anterior margin of orbit, its length 3.13 in head; mandible long, reaching to below middle of pupil. 2.3 in head; teeth almost microscopic, in both jaws, none on tongue; gill-rakers long, slender, and numerous, 10+26 and 13+28; dorsal high, its longest ray (about the third) about 1.3 in head and about twice length of base; base of dorsal 2.5 in head; dorsal rays shortening rapidly after third and fourth, leaving the margin of the fin very slightly concave; insertion of dorsal midway between tip of snout and a point about half way between adipose and caudal fins; caudal large, equally forked, both lobes and indentation acutish; anal low, its longest ray 2.25 in head, its base 2 in head, its posterior margin slightly concave; ventrals inserted somewhat behind origin of dorsal, reaching about two-thirds distance to origin of anal, the length of their longest rays about 1.3 in head; pectoral equaling ventral.

Bluish above, with minute black punctulations; sides below lateral line and a short distance above, silvery, belly white; dorsal and caudal almost imperceptibly dusky; other fins wholly plain; iris silvery, a narrow blackish ring about the orbit, plainest above and below.

This little fresh-water herring is probably not so abundant in the Yukon basin as the two preceding species.

The species was originally described by Bean (1889) as *Coregonus pusillus* from Kuwuk (Kobuk) River. He had previously recorded it in Cruise of the Corwin (1889) as *Coregonus merckii* var., from Hotham Inlet, Kotzebue Sound. It has also been recorded by Bean (1882) from St. Michael and northern Alaska; by Nelson (1887) from Andreafski, Yukon River, and by Scofield (1899) from Grantley Harbor and Barter Island near the mouth of the Mackenzie River.

23. *Argyrosomus laurettæ* (Bean).

Originally described by Bean (1882) as *Coregonus laurettæ* from Point Barrow and Port Clarence, and recorded by him also from the Yukon River at Nulato. Other records are as follows: Yukon River at Nulato (Nelson 1887); Meade and Kuaru rivers and Elson Bay (Murdoch 1885); and Nushagak and Naknek rivers (Gilbert 1895).

24. *Argyrosomus lucidus* (Richardson).

The only record for this species is Hershel Island (Scofield 1899).

25. *Argyrosomus alascanus* Scofield. (Pl. xiv, fig. 1.)

Originally described from Point Hope and Grantley Harbor (Scofield 1899); not yet known from any other place.

26. *Stenodus mackenzii* (Richardson). *Inconnu*.

Although no specimens were obtained by us, this species is known to occur in the headwaters of the Yukon. It has been reported to us by Messrs. Osgood and Maddren, who saw it in the Yukon in 1900. Mr. Presnell, of Chignik Bay, says that he saw an example 10 inches long at Eagle City in 1898 which had been taken through an air hole in the ice, and he thinks he saw another, weighing 3 or 4 pounds, on Forty-mile Creek.

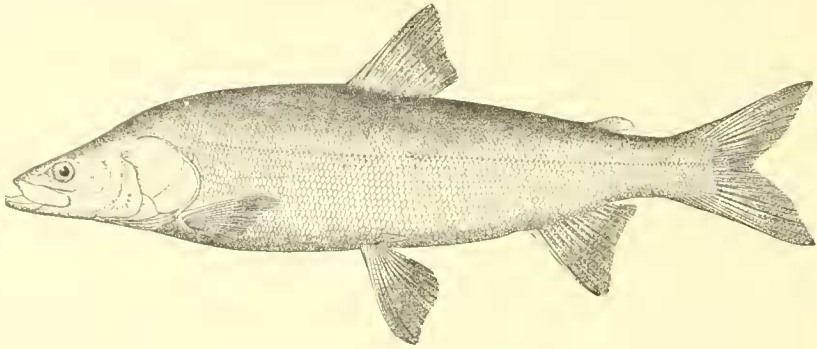


FIG. 9.—*Stenodus mackenzii* (Richardson).

Townsend (1887) records one specimen taken in the Middle Klawak (Kobuk) in August, 1885; Nelson (1887) records it from the Yukon at Nulato, Kotlik, and Andreafski; Turner (1886), from St. Michaels; and Scofield (1899) from the Mackenzie River.

27. *Oncorhynchus gorbuscha* (Walbaum). *Humpback Salmon; Pink Salmon*. (Pl. XXIII—XXVI.)

The humpback salmon is the most abundant salmon in Alaskan waters. It exists in millions, swarming everywhere along the shores and in waters near the sea, in streams, brooks, lakes, swamps, and brackish lagoons—in fact, in all places where fresh water, however little, may be found. It is ordinarily not found far from shore, and does not run up the streams for great distances. It does not frequent the larger rivers, and is therefore almost unknown in the Sacramento and Columbia, and even in the Fraser; but in the smaller streams it is found practically everywhere from California to Bering Sea, wherever a stream of fresh water, however small, enters the sea. Dr. Bean records it from Refuge Cove, Cook Inlet, and St. Paul, Kodiak Island; also from Colville River. Townsend (July 2 to August 25, 1885) found it in the Middle Kobuk River; not more than a half dozen individuals were seen, however, among the large numbers of fishes examined at every village of natives. Scofield (1899) found this species at Port Clarence about the middle of July, at which time it was beginning to run up the river back of the inner harbor. Gilbert (1895) says:

The humpback salmon was seen by us at Port Möller on the northern side of the Alaskan Peninsula, during two visits, which included the first two weeks and the last week of July, 1890. During the first part of this month they were running in small numbers, and, as a few scattered ones only had been taken at Unalaska up to June 16, 1890, it is safe to indicate the first of July as the beginning of their appearance on that part of the coast. In the early part of their run they proved a very acceptable fish, but later they rapidly deteriorated. On our return to Unalaska, July 31, 1890, we learned that they had been running for several weeks, and during several visits in the month of August they were found in incredible numbers crowding into the mouths of the small streams which flow into Captains Harbor. Both pools and shallows seemed full of them and large numbers were dying within a few hundred yards of the beach. The spawning season appeared to begin early in August.

According to Murdoch (1885), humpback salmon occur sparingly at Perignak, Elson Bay. Nelson (1887) states that the run at St. Michael begins about the middle of June and that the fish continue rather numerous until the end of July. They were seen in abundance at all places visited by us in July and August. On July 8 some were taken in a gill net in Yes Bay. At Klawak they are plentiful and unusually large, running about 14 to the case in canning. Usually 20 to the case is a fair average, though they often run as small as 25 to 30 to the case.

At Afognak Falls, August 3, humpback salmon were found running in great numbers; they were seen in all parts of the stream below the falls, some jumping, others in the water often with their fins

sticking out. The falls are in several parts, three being of considerable height, and with quieter water between. The upper or main fall is far more serious, and the salmon make many unsuccessful attempts to ascend it. The lip of the fall is very irregular and broken in many places, and at different levels are found pools or corners with less turbulent water where the fish can rest on their way up.

Just below this fall is a large relatively quiet pool extending the full width of the stream and perhaps 100 feet down the stream. This pool was literally packed with salmon; they seemed to be lying nearly as close together as possible and there must have been many thousands of them. Nearly or quite all of them, unless disturbed, lay with their heads upstream. They were all restless and seemed to be moving about more or less, usually trying to get nearer the fall—some pushing upward to the edge of rough water, then jumping wildly, sometimes gaining a little, but more often hitting the bank or some projecting rock or swift water and gaining nothing. Immediately under the fall they were jumping all the time. During the hour of observation there was scarcely a moment when one or more salmon could not be seen in the air or making their way against the nearly vertical current. The vantage ground from which they started was not good and the jumping appeared to be aimless and at random. Often they would jump straight up when some distance below the fall, frequently the wrong way, sometimes even downstream; sometimes striking the bank or a projecting rock, to be thrown back into the water, only to try the leap again. Occasionally a salmon which had reached the foot of a descending sheet of water would, with better judgment, jump toward the sheet and perhaps strike part of the way up, where it would maintain itself for a moment, perhaps advancing a short distance, but finally losing, to be carried or dashed, sometimes sidewise, sometimes headforemost, back into the pool below. During all the time of observation by the authors not a single salmon was seen to make the fall, but others of the party saw some succeed, and in the stream above the falls were seen several salmon that of course had gotten over. Into one pool easy of access, at the foot of the fall and containing as many salmon as it could possibly hold, one of us put his hand to lift a salmon out. By closing the hand over the gills it was possible to hold on to the fish without any difficulty, and so long as this succeeded the other fish took no alarm, but when one escaped it and all the others scurried down the falls in the most reckless way.

The entire stream from the falls to its mouth was well filled with salmon. Nearly all appeared to be humpbacks, although there were evidently a few sockeyes among them. Nearly all of both species were fresh from the sea and apparently in excellent condition.

In many places humpback salmon were seen jumping, in bays, passages and river mouths. At Sitka (August 20) boys were seen gaffing them in Indian River near its mouth. The males were greatly humped. All reports were to the effect that the run in the streams near Sitka was unusually large in 1903. The same was true at Killisnoo. We often saw humpback salmon along the shore where the only fresh water was seepage through the sand and gravel. They would often throw themselves out on the beach in their efforts to reach fresh water. Humpbacks are said to occur in the Yukon in July and August, though in limited numbers. We seined large numbers on July 25 at Pablob Bay, southeast Alaska; also at Sitkoh Bay, July 26. The species was noted also in Silver Creek near Sitka, July 29. Fry 1.3 inches long were taken May 22 with a lot of coho fry in sloughs or little pools along the Karluk River near its source.

The run of humpbacks extends, perhaps, through a longer period than that of any other species. In Southeast Alaska it begins in June and continues until September or even later in some places. Northward the period is somewhat shorter. On Puget Sound and southward it is more prolonged and continues late in the fall. As already stated, the humpback salmon as a rule do not ascend streams to great distances. If they enter large rivers at all they are apt to run into the first small tributary stream which they reach. They prefer, however, the smaller coastal streams, and are therefore not often seen in numbers at any distance from the sea.

They are quite persistent, and, in a measure, successful in their efforts to ascend streams in which considerable falls occur. Observations similar to those on their attempts to ascend Afognak Falls were made at Pablob Falls July 25, and at Dorr Falls, Naha Stream, August 30, and indicate that the humpback jumps quite as well as any of the other species of salmon. Where the water conditions—depth, current, width, etc.—are favorable it can probably make a vertical jump of 10 feet, but to ascend a fall with that vertical height frequent attempts would probably be made before success was attained, as the jumping appears to be more or less at random. It is perfectly evident that the salmon does not select a particular point on or near the lip of the falls where it proposes to strike; it simply jumps aimlessly, and sooner or later strikes the fall at a place where it is able to maintain itself and from which it can ascend into more quiet water above the falls.

Unlike the sockeye, this salmon does not refuse to enter streams which have no lakes in their headwaters. It seems to be entirely indifferent as regards this stream character; it selects its spawning beds in streams with or without lakes in their course. If in a stream with lakes, the beds may be in the stream above the lake, below the lake, or even in the lake itself. If there be one essential feature, aside from temperature, it is probably that the stream must be a relatively small one.

The humpback is the smallest of the 5 species of Pacific coast salmon. The results of a large number of measurements and weights are shown in the table which follows:

LENGTHS AND WEIGHTS OF HUMPBACK SALMON.

Locality and date.	Number examined.	Sex.	Length.			Weight.			Average for all.	
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Length.	Weight.
			Inches.	Inches.	Inches.	Lbs.	Lbs.	Lbs.	Inches.	Pounds.
Shipley Bay Aug. 24	57	♂	26.00	19.25	22.65	6.00	2.25	3.97	22.42	3.77
	59	♀	23.75	19.5	22.20	4.5	2.00	3.55		
Bear Harbor	30	♂	26.75	20.75	22.99	7.00	3.00	4.63	23.25	4.00
	70	♀	24.25	18.25	23.87	5.75	2.00	3.73		
Port Ellis, Home Stearn (Aug. 22)	44	♂	26.50	20.00	23.25	7.00	2.50	4.26	22.33	4.06
	56	♀	24.00	17.00	21.60	5.50	2.00	3.91		
Sukkwan (Aug. 28)	42	♂	25.75	19.00	22.47	7.00	2.75	4.02	22.13	3.93
	59	♀	23.75	19.00	21.80	5.5	2.50	3.86		
Hunter Bay (Aug. 28)	35	♂	26.75	21.75	24.33	7.00	4.00	5.24	23.09	4.62
	65	♀	25.00	19.5	22.43	6.00	2.5	4.28		
Funter Bay (July 23)	92	♂			21.89			4.16	23.17	4.83
	108	♀			23.61			5.57		
Do.	7	♂			22.87			4.36		
	11	♀			22.87			4.36		
Yakutat (Aug. 18)	4	♂	27.00	23.00	24.25	6.00	5.00	5.5	23.00	4.64
	7	♀	23.00	21.00	22.3	5.00	3.00	4.14		
Litnik Bay (Aug. 3)	40	♂			21.9			3.9	21.6	3.8
	10	♀			21.00			3.7		
Klawak	53	♂	27.00	23.00	24.80	8.00	4.00	5.66	23.78	4.84
	97	♀	25.00	20.00	23.21	6.00	2.00	4.39		
Cleveland Passage (July 13)	28	♂	25.25	20.00	22.50	8.00	2.00	4.85	22.46	4.77
	7	♀	24.00	20.00	22.86	5.5	3.00	4.42		
Yes Bay (July 17)	71	♂			11.5	2.75	7.7	6.9		
	52	♀			7.5	3.5	5.9			
Kegan (Aug. 16)	41	♂			7.75	3.00	5.1	4.7		
	59	♀			6.00	2.5	4.4			
Nowiskay (Aug. 19)	41	♂			9.00	3.00	5.1	4.7		
	59	♀			5.5	3.5	4.5			
Quadra (Aug. 6)	97	♂			8.5	3.00	5.65	5.2		
	108	♀			7.00	2.75	4.8			
Karta (July 26)	61	♂			10.00	3.25	5.3	4.7		
	91	♀			6.75	2.5	4.4			
Karta (Aug. 2, 1904)	50	♂			7.00	2.5	4.8	4.55		
	15	♀			6.00	3.25	4.4			
Seowl Arm (Aug. 2)	50	♂			7.5	2.5	4.8	4.7		
	20	♀			5.25	3.25	4.6			
Wood River (July 19)	4	♂	21.25	19.00	21.062	2.5	2.00	2.375	19.972	2.333
	5	♀	20.75	18.75	19.5	3.00	2.00	2.3		
Nushagak River (July 22)	62	♂	24.00	19.00	21.487	6.00	2.5	4.032	21.004	3.809
	30	♀	20.75	18.25	20.00	4.25	2.5	3.35		

Three dozen humpback salmon (both sexes) were weighed at the cannery at Wrangell, July 13. The average weight was 5.8 pounds, the average length 24 inches. At the cannery of the Thlinket Packing and Trading Company, July 23, 30 fish (both sexes) gave an average weight of 4.2 pounds and an average length of 24.46 inches.

A male humpback taken in a gillnet in Yes Bay, July 9, was 25 inches long and weighed 7 pounds.

From the above (omitting those weighed in 1903 and 1904 by Mr. Chamberlain, for which the lengths are not given) it appears that the largest male humpback examined was 27 inches in total length and that the maximum weight was 8 pounds. The smallest male was 19 inches long and the minimum weight 2 pounds. The largest female was 25 inches long and the heaviest weighed 5.5 pounds. The smallest female was 17 inches long and the minimum weight was 2 pounds. The average of 341 males was in length, 23.19 inches, in weight 4.3 pounds; of 441 females, length 22.59 inches, weight 4 pounds. The average length of the 782 fish (both sexes) was 22.64 inches, and the average weight 4.13 pounds. The examples weighed by Mr. Chamberlain at various places in 1903 and 1904 appear to be somewhat heavier than those examined by us. The 11.5-pound male weighed by him at Yes Bay, July 17, is 3.5 pounds heavier than any examined by us. And the heaviest female (7.5 pounds) examined by him

was 2.5 pounds heavier than the heaviest weighed by us. The average weight of 1,597 fish (782 weighed by us, 815 by Mr. Chamberlain) was 5.25 pounds. The Yes Bay humpbacks appear to be heavier than any others.

An examination of these figures and the detailed data on which they are based does not, however, indicate that any geographic races can be recognized. While the averages for the different streams show considerable differences in some instances, the individuals from any one stream lack homogeneity and show a range of variation in length and weight great enough to include that of the different streams.

The humpback salmon is known to the Russians as *gorbuscha* and to the trade as pink salmon. Not until recently in the history of the salmon-canning industry has it been utilized. Its flesh is pale or pink in color, less firm in texture, and with less of the salmon flavor characteristic of the sockeye and chinook. For these reasons canners were slow to utilize it. A few years ago, however, a number of enterprising canners began putting up this species under the name of pink salmon and during the last five or six years the industry has developed enormously. The pack of many canneries which originally put up nothing but reds consists now largely, in some cases almost wholly, of pinks. Many canneries which at first utilized the humpbacks only at the end of the season in order to make up their guaranty are now canning them whenever they can get them.

Although as a canned product not ranking as high as the red, the king, or the coho, pink salmon is a delicious article, palatable, very nutritious, and thoroughly wholesome in every way. As a food product its place is now established and in the future it will only increase in popularity. When fresh and directly from the sea it is, next to the king, generally regarded as the best of all the salmon as a fresh fish. As a salted fish also it ranks high, and salted humpback bellies are esteemed a great delicacy. This fish, however, does not keep well in the fresh state, the flesh becoming soft soon after the fish is taken out of the water and becoming tainted in forty-eight hours or less, even in the cool climate of Alaska. By the time the fish has reached the spawning beds or even the mouths of the rivers, its flesh has lost most of the oil it had and is then almost worthless as food. Only when caught some time before it would have entered the streams is it fit for food.

The catch of humpbacks in 1906 was second in value only to the red salmon. In that year the total number of humpback salmon utilized in the Alaskan fisheries, as given by the Alaska salmon agents, was 7,707,999. The bulk of these were canned, though many were utilized in other ways, as fresh, salted, etc. Reducing the entire catch to the basis of canned salmon, the total product for 1906 equaled 357,428 cases which, at average current prices, was valued at \$1,061,463.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR HUMPBACK SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906.

NOTE.—The fact that the name of a river is given does not necessarily mean that fishing is carried on in the river itself; in many instances the fishing station is in the vicinity of the stream and its name has been used in order more clearly to locate the streams. The dates given do not necessarily mean the beginning and ending of the run for each stream, as the fish may have been running for some time before the cannery men were able to fish the stream, and the pack may have been obtained and fishing stopped before the end of the run.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Bering Sea.</i>								
Nushagak Bay.....			June 8	Aug. 6	June 19	June 30	June 16	Aug. 4
Wood River.....							July —	
Kvichak River.....	July 15	July 25	June 21	Aug. 5	June 26	July 26	June 20	Aug. 7
Naknek River.....	July 23	July 28	July 1	Aug. 2	June 14	July 30	June 21	July 31
<i>Central Alaska.</i>								
Chignik Lagoon and River.....	July 2	Aug. 19	June 10	Aug. 14				
Kodiak Island: Karluk.....			July 26	July 26				
Cook Inlet (Kasilof).....							Aug. 8	Aug. 13
Prince William Sound: Cordova Bay.....			July 2	July 12				
<i>Southeast Alaska.</i>								
Yakutat Bay: Humpback Creek.....			Aug. 1	Aug. 20	July 26	Aug. 8		
Situk River.....			July 15	July 30	July 14	Aug. 10	July 5	Aug. 11
Ankau River.....			July 20	Aug. 2			do.	July 31

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR HUMPBACK SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906—Continued.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska</i> Continued.								
Ankau Slough.....			July 13	July 27	July 26	Aug. 8	.....do.....	Aug. 9
Abrnklin River.....			.....do.....	Aug. 17	[No run]	.....do.....	.....do.....	.....do.....
Surge Bay, Yakobi Island.....					July 25	Aug. 20	July 25	Aug. 11
Takamis Bay, Yakobi Island.....					July 20	Aug. 27	Aug. 3	Aug. 3
Cape Edward, off Chichagof Island.....					Aug. 21	Aug. 31		
Portlock Harbor, Chichagof Island.....					Aug. 10	Aug. 10	Aug. 25	Aug. 25
Cross Sound:								
Soapstone Point, Yakobi Island.....					July 31	Aug. 1		
Lisianski Strait.....					July 28	Aug. 3	July 25	Aug. 7
Port Althorpe, Chichagof Island.....					July 27	Aug. 5		
James Bay (?).....					.....do.....	July 27		
Kochtakeene (?).....					Aug. 4	Aug. 13	July 25	Aug. 13
Icy Strait:								
Dundas Bay.....					July 24	July 27		
Glacier Bay—								
Bartlett Bay.....					July 29	July 29	July 17	July 28
Pleasant Island.....			July 1	Aug. 24	June 22	Sept. 14	July 12	Sept. 6
Lynn Canal.....			June 25	Sept. 15			June 26	Sept. 22
Chilkoot Inlet and River.....			June	Sept. —				
Eagle River.....					July 15	Sept. 15	June 21	Aug. 22
Tee Harbor.....			July 1	Sept. 7				
Lena Cove.....					July 1	Sept. 15		
Point Louisa.....					.....do.....	.....do.....		
Auk Bay.....			June 25	Sept. 7	.....do.....	.....do.....		
Chatham Strait:								
Funter Bay, Admiralty Island.....			June 1	Sept. 15	July 3	Sept. 16	June 21	Do.
Basket Bay, Chichagof Island.....			July 12	Aug. 24				
Flat Bay, Chichagof Island.....			July 20	Aug. 25				
White Rock, Chichagof Island.....			.....do.....	.....do.....				
Sitkoh Bay, Chichagof Island.....			July 12	Aug. 24				
Peril Strait, Rodman Bay, Baranof Island.....			July 1	.....do.....				
Bay of Pillars.....					July 25	Aug. 20		
North Arm, Kuiu Island.....							July 25	Aug. 30
South Arm, Kuiu Island.....	July 15	Aug. 31					.....do.....	Do.
St. Michael Bay: Kuiu Bay, Kuiu Island.....			July 20	Aug. 1	July 25	Aug. 15	July 20	Do.
Stephens Passage.....			June 25	Sept. 7	July 1	.....do.....	July 20	
Taku Inlet.....			July 1	.....do.....	.....do.....	.....do.....		
Port Snettisham.....	July 25	Aug. 16	July 4	Aug. 4	.....do.....	.....do.....		
Seymour Canal.....							June —	Aug. —
Pleasant Bay, Admiralty Island.....			July 20	Sept. 1				
Frederick Sound:								
Saginaw Bay, Kuiu Island.....							July 23	Aug. 27
Portage Bay, Kupreanof Island.....			Aug. 19	Aug. 23				
Cleveland Passage.....							July 17	Do.
Wrangell Strait:								
Petersburg Creek, Mitkof Island.....			July 23	Aug. 22	July 15	Aug. 31	July 10	Aug. 28
Blind Point, Mitkof Island.....					July 1	Oct. 1	Aug. 14	Do.
Duncan Canal, Kupreanof Island.....			July 26	Aug. 25	July 16	Sept. 6	July 23	Aug. 25
Sea Otter Sound: Fokhini Stream, Kosciusko Island.....							Aug. 4	Sept. 9
Iphigenia Bay: Warm Chuck, Heeeta Island.....							Sept. 3	Sept. 5
Tonowek Bay:								
Sarkar, Prince of Wales Island.....					July 15	Aug. 31		
Nabakay, Prince of Wales Island.....							Aug. 8	Aug. 24
Gulf of Esquibel: Sbineha Creek, Prince of Wales Island.....			Aug. 3	Aug. 8			Aug. 1	Aug. 9
San Alberto Bay:								
Klawak Inlet, Prince of Wales Island.....	July 16	Aug. 27	Aug. 1	Aug. 26	July 29	Aug. 29	July 24	Sept. 1
Big Harbor, Prince of Wales Island.....							.....do.....	Do.
Tlovak Strait: Skookum Chuck.....							Aug. 8	Sept. 3
Cordova Bay: Hetta, Prince of Wales Island.....							July 24	Sept. 1
Sumner Strait:								
Shipley Bay, Kosciusko Island.....							July 27	Aug. 31
Shakan Bay, Prince of Wales Island.....							Aug. 30	Aug. 30
Caidar and Elcopdam Bay, Prince of Wales Island.....							July 27	Do.
Hole-in-the-Wall, Prince of Wales Island.....							July 30	Aug. 23
Seclusion Harbor, Kuiu Island.....			Sept. 1	Sept. 8				
Point Barrie Stream, Kupreanof Island.....			July 19	Aug. 24	July 14	Aug. 28	July 15	Do.
Totem Bay, Kupreanof Island.....			Aug. 12	Sept. 6	Aug. 25	Aug. 25	Aug. 17	Aug. 24
Red Bay, Prince of Wales Island.....			July 23	Aug. 28	July 2	Sept. 3	July 25	Aug. 31
Blind Slough, Kupreanof Island.....			Sept. 1	Sept. 4				
Stikine River.....					July 23	Aug. 25	July 9	Aug. 4
Zimovia Strait:								
Olive Bay, Etolin Island.....			July 25	Aug. 1	July 12	July 28	July 20	Aug. 1
Thoms (Old Village) Stream, Wrangell Island.....	Aug. 5	Aug. 18					Sept. 1	Sept. 3

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR HUMPBACK SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906—(Continued).

Waters	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska—Continued.</i>								
Clarence Strait:								
Salmon Bay, Prince of Wales Island			July 25	Aug. 13	July 9	Sept. 6	June 15	Sept. 4
Eagle Creek, Prince of Wales Island			do	Sept. 4	July 1	Sept. 1	do	Do.
Whale Passage, Prince of Wales Island					do	Sept. 8	do	Sept. 10
Lake Bay, Prince of Wales Island					do	Sept. 1	do	Sept. 4
Collman Cove, Prince of Wales Island							do	Do.
Valdemar Bay, Prince of Wales Island			Aug. 12	Aug. 14				
Steamer Bay, Etolin Island			do	Aug. 21				
Rocky Bay, Etolin Island			July 27	Sept. 10	July 19	Aug. 8	June 15	Sept. 4
Ratz Harbor, Prince of Wales Island					July 1	Sept. 1	do	Do.
Ernest Sound—								
Union Bay, Cleveland Peninsula			Aug. 1	Aug. 8	Sept. 2	Sept. 4	July 17	Aug. 14
Vixen Point, Cleveland Peninsula							July 8	Aug. 26
Etolin Cove, Etolin Island (?)							Aug. 25	Aug. 30
Menefee Inlet, Etolin Island							July 25	Aug. 5
Santa Anna Bay, Cleveland Peninsula							Aug. 27	Aug. 27
Point Warde, Cleveland Peninsula							June 27	July 28
Anan Creek, Cleveland Peninsula							June 15	Sept. 4
Midway Cove (?)							July 14	Aug. 30
Meyers Stream, Cleveland Peninsula							Sept. 1	Sept. 3
Thorne Bay, Prince of Wales Island							Aug. 1	Sept. 4
Kasaan Bay—								
Karta Bay, Prince of Wales Island	July 18	Aug. 20					July 28	Sept. 3
Twelve Mile Arm, Kina Stream, Prince of Wales Island							do	Do.
Skowl Arm, Prince of Wales Island					Aug. —	Sept. —	do	Sept. 5
Behm Canal—								
Naha Stream, Revillagigedo Island			July 31	Sept. 1				
Yes Bay, Cleveland Peninsula	July 15	Sept. 14	July 19	Aug. 19			Aug. 2	Aug. 29
Unuk River								
Chickamin River			Aug. 15	Aug. 22				
Checats Stream	July 15	Aug. 16	July 11	Aug. 17			July 17	Aug. 3
Smeaton Bay			Sept. 3	Sept. 3				
Tongass Narrows—								
Ward Cove, Revillagigedo Island	Aug. 3	Sept. 7	Aug. 5	Aug. 11			July 23	Sept. 6
Ketchikan Creek, Revillagigedo Island							Aug. 20	Sept. 5
Cholmondeley Sound			Aug. 1	Aug. 28	Aug. 5	Sept. 1	July 30	Sept. 15
Dora Bay, Prince of Wales Island			July 9	Aug. 20	July 29	Aug. 29	July 28	Sept. 6
Peter Johnson Stream (Dolomi), Prince of Wales Island	July 23	Sept. 1	Aug. 5	Sept. 8	Aug. 1	Aug. 28	June 30	Sept. 6
Moir Sound—								
North Arm, Prince of Wales Island			July 14	Aug. 22	July 29	Aug. 29	July 13	Sept. 8
Shalclair, Prince of Wales Island					Aug. 8	do		
Browns, Prince of Wales Island					do	do		
South Arm—								
Kegan Stream, Prince of Wales Island			Aug. 2	Sept. 1	July 29	Aug. 29	July 11	Sept. 6
Nowiskay Stream, Prince of Wales Island			Aug. 9	Aug. 25				
Old Johnson Stream, Prince of Wales Island			Aug. 4	Aug. 31			July 13	Sept. 3
Nichols Passage—								
Blank Inlet, Gravina Island							Aug. 2	Aug. 29
Bostwick Inlet, Gravina Island			Aug. 22	Sept. 7				
Hemlock Island, off Annette Island			Aug. 6	Aug. 31	Aug. 7	Aug. 14		
Tain, Annette Island			July 27	do	Aug. 2	Sept. 1	July 26	Sept. 13
Tamgas Harbor, Annette Island	July 24	Sept. 1	Aug. 3	do	July 29	do	July 24	Aug. 29
Nadzaeer, Annette Island			Aug. 16	Aug. 23	Aug. 7	Aug. 21		
Revillagigedo Channel:								
George Inlet, Revillagigedo Island	July 20	Sept. 4	July 7	Sept. 5			July 6	Sept. 1
Carroll Inlet, Revillagigedo Island			Aug. 14	Aug. 21				
Thorne Arm, Revillagigedo Island							Aug. 24	Aug. 24
Hassler Harbor, Revillagigedo Island			Aug. 28	Sept. 3				
Nancy Haines (?)							Sept. 14	Sept. 19
Duke Island							Aug. 8	Aug. 31
Boca de Quadra	July 15	Aug. 12	July 9	Aug. 27			July 21	Aug. 26
Kah Shakes Cove							July 24	Aug. 23
Foggy Bay			Sept. 1	Sept. 3				
Nakat Inlet							Aug. 7	Aug. 10

28. *Oncorhynchus keta* (Walbaum). *Dog Salmon; Chum; Calico Salmon.* (Pl. xxvii and xxviii.)

The dog salmon is a species of wide distribution. On the American coast it occurs from San Francisco northward at least to Hotham Inlet, Kotzebue Sound, and Bering Strait (Bean 1882). It is found also on the Asiatic coast and is the principal salmon in Japanese waters, where it is known as *saké*. It is not abundant on the coast of California, but increases in numbers northward, being most abundant in Southeast Alaska. Dr. Bean records it from Old Sitka, from Alexandrovsk, Cook Inlet, and from St. Paul, Kodiak Island. Mr. Hess reports its occurrence at Teller in a stream flowing into Port Clarence. In the streams of Seward Peninsula it runs from July 15 to August 31; then comes a mixture of dog salmon and silver salmon. The species was found by Mr. Hess on July 1, 1900, near Council, in the lower Fish River, which flows into Golofinin Bay.

It is said that the run of salmon in the Tanana is not great enough for canning purposes; but in the Yukon at the mouth of the Tanana the run of salmon (all species) is probably enough to justify commercial fishing. Mr. Townsend (1885) records it as the principal salmon of the Kobuk River.

According to Mr. E. W. Nelson (1880) the dog salmon is abundant at St. Michael. The run begins at the end of June and is over by the last of July. On account of its great abundance, this is to the Eskimo the most valuable food fish about the shores of Bering Sea and the lower Yukon and Kuskokwim rivers. On the lower Yukon the main run occurs between the last of June and the end of July. The fish is rarely taken at St. Michael before June 12.

Dog salmon are said to go through Chilkoot Lake and spawn in its inlets, but we have no positive knowledge to this effect. At Sitka on August 20, where boys were seen gaffing salmon at the bridge across Indian River, several dog salmon were noted.

Dog salmon were seen by us at most of the canneries visited, especially in August. We saw them at Taku Inlet (July 14), Killisnoo and Sitkoh Bay (July 26), Chignik (August 9 and 10), Kell Bay (August 23), Dundas Bay, Point Ellis (August 21), Funter Bay (July 23), Hunter Bay (August 28), Cleveland Passage (July 13), Pillar Bay and Loring.

The run of dog salmon in Alaska seems to come later than that of any other species except the coho. In Southeast Alaska the season is not at its height until late in August or September. Spawning fish have been taken in the vicinity of Fort Yukon in August and September. Like the humpback, the dog salmon seems to prefer the smaller, coastal streams. Although it runs to some extent in the larger rivers, such as the Columbia, Copper, and Yukon, it ordinarily does not ascend them to great distances. It is unknown in the headwaters of the Columbia; the records of "dog salmon" there and in the headwaters of other large rivers probably refer in most cases to spawning males of the chinook salmon, which are, in many places, popularly known as "dog salmon." This species is most abundant in small streams near the sea and in the small lower-course tributaries of the larger streams.

The dog salmon is second in size only to the chinook, as is shown by the following table. A total of 202 samples were examined. The average weight of these was 8.33 pounds, the average length, 29 inches. The largest male examined was 35 inches long and weighed 16 pounds; the smallest was 25.5 inches long and weighed 5 pounds. The largest female was 33 inches long and weighed 15 pounds, the smallest female was 25 inches long and weighed 7 pounds.

MEASUREMENTS AND WEIGHTS OF DOG SALMON.

Locality.	Number examined.	Sex.	Length.			Weight.			Average length.	Average weight.
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.		
			<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Inches.</i>	<i>Pounds.</i>
Chignik.....	1	♂	33.87			13.00			29.37	9.34
	3	♂	27.87	26.13	27.08	8.13	7.24	7.57		
Sukkwai.....	1	♂	32.75			10.00			30.87	10.00
	1	♂	29.00			10.00				
Funter Bay.....	2	♂	35.00	35.00	35.00	16.00	15.00	15.5	31.17	12.17
	4	♂	33.00	25.00	29.25	15.00	8.00	10.5		
Point Ellis.....	1	♂	31.50					16.00	31.50	16.00
	1	♂	30.00					12.00		
Dundas Bay.....	3	♂			29.2			9.67	29.40	10.00
	16	♂	32.50	26.25	29.80	12.00	6.00	8.44	29.17	8.29
	14	♂	30.50	27.50	28.45	9.00	7.00	8.11		
Cleveland Passage.....	1	♂	29.50			12.00			29.50	12.00
Nushagak River.....	15	♂	32.00	25.50	28.683	11.00	5.00	8.4	28.001	7.596
	11	♂	29.13	25.50	27.102	9.00	6.00	7.045		
Kogmung.....	1	♂	27.50			7.50			27.50	7.50
Ugashik River.....	59	♂	32.00	28.25	30.00	14.00	6.5	9.038	29.015	8.192
	68	♂	30.75	25.00	28.158	12.00	6.5	7.459		

As a food fish this species is inferior to all the other salmon. The inferiority, however, is more marked when the fish is canned than when otherwise utilized. The flesh is soft and spongy and does not lend itself readily to canning processes. It is pale in color and therefore not so attractive in appearance as that of the other species. When utilized fresh the fish takes a higher rank. It is coming more and more to be frozen and shipped east or abroad, and is meeting with much favor in that form. Considerable quantities are being dry-salted for the Japanese market. In Japan this species is highly prized and is a valuable product of the fisheries. It is the most abundant salmon in that country.

When fresh run from the sea the dog salmon is a handsome fish, plump and silvery, very attractive in appearance, and closely resembling the silver salmon. Later the dark of the back tends to form vertical bars which extend down on the sides. In the breeding season the body becomes largely dirty black, obscurely barred with dirty red, the jaws become greatly elongated and distorted, and the teeth show prominently. Frequently the flesh is dirty red and soiled white alternately in broad bands which, together with the banding on the surface, doubtless suggested the name calico salmon. The Russians call this salmon *hayko* or *lekai*, while to the Japanese it is *saké*. The trade name on our coast is chum.

Although the dog salmon does not yet rank high in popular favor, and while it is commercially the least valuable of the several species of salmon except the coho, it is nevertheless a valuable fish, one destined to become more and more appreciated as we learn better methods for its utilization. The flesh, though not so red nor so firm and flaky as in other species, is no less nutritious and no less wholesome. At present it is probably better to utilize it either fresh or by dry-salting rather than by canning.

During the season of 1906 the dog salmon fishery increased enormously over previous years. The total number of fish utilized was 3,259,384. Reducing the entire catch to a canned salmon basis it is equivalent to 273,459 cases, valued at \$755,374.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR DOG SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1904-1906.

NOTE.—The fact that the name of a river is given does not mean that fishing is carried on in the river itself; in fact, the fish are nearly always caught before they enter the streams. In many instances the fishing station is in the vicinity of the stream and its name has merely been used to locate the station more clearly. The dates given do not necessarily mean the beginning and ending of the run for each stream, as the fish may have been running for sometime before the cannery men were able to fish the stream and the pack may have been obtained and fishing stopped before the end of the run.

Waters.	1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Bering Sea.</i>						
Nushagak Bay ^a	June 25	July 5	June 1	July 28	June 11	Aug. 4
Kvichak River.....	July 1	July 31	June 24	July 22	June 25	Aug. 7
Naknek River.....					June 23	July 30
Ugagak River.....			June 23	July 25	June 15	July 25
Ugashik River.....	July 4	Aug. 1	June 13	July 28	June 18	July 31
Nelson Lagoon.....					June —	July —
<i>Southeast Alaska.</i>						
Icy Strait:						
Dundas Bay.....			Sept. 1	Sept. 1	Aug. 26	Aug. 31
Glacier Bay—Bartlett Bay.....			Aug. 26	Sept. 10	Sept. 5	Sept. 18
Pleasant Island.....	June 15	Oct. 8	June 22	Oct. 15	Aug. 15	Sept. 5
Excnrsion Inlet.....					Sept. 8	Sept. 18
Port Frederick, Chichagof Island.....			July 10	Oct. 15		
Lynn Canal.....	June 25	Oct. 8			June 26	Sept. 22
Chilkat Inlet and River.....	June 24	Sept. 23	Aug. 15		June 29	Do.
Eagle River.....					June 21	Sept. 5
Tee Harbor.....	July 1	Sept. 7				
Lena Cove.....			July 1	Sept. 15		
Point Louise.....			do.	do.		
Auk Bay.....	June 25	Sept. 7	June 25	do.		
Chatham Strait:						
Funter Bay, Admiralty Island.....	June —	Sept. 15	June 19	Sept. 16	June 21	Sept. 5
Gut Bay.....			July 20	Oct. 27		
Bay of Pillars—						
North Arm, Kuiu Island.....			July —	Oct. —	July 20	Aug. 1
South Arm, Kuiu Island ^b						
St. Michael Bay—Kuiu Bay, Kuiu Island.....			July —	Oct. —	July 20	Aug. 1
Stephens Passage.....	June 25	Sept. 7	June 25	Sept. 15		
Taku Inlet ^c	July 1	do.	do.	do.		
Port Snettisham ^d	July 4	Aug. 4	do.	do.		
Seymour Canal.....					June —	Aug. —

^a 1900, June 19 to July 1.

^b 1900, July 15 to August 31.

^c 1900, August 15 to September 25.

^d 1900, July 9 to September 24.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR DOG SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1904-1906—Continued.

Waters.	1904.		1905.		1906.	
	Fishing began—	Fishing ended	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska—Continued.</i>						
Frederick Sound:						
Security Bay, Kuiu Island.....			July 20	Oct. 27		
Saginaw Bay, Kuiu Island.....	Sept. 1	Sept. 20	do.	do.	July 23	Aug. 27
Port Camden, Kuiu Island.....			do.	do.	Aug. 30	Sept. 14
Cleveland Passage.....					July 17	Aug. 27
Wrangell Strait:						
Petersburg Creek, Mitkof Island.....					July 5	Aug. 22
Blind Point, Mitkof Island.....			July 20	Oct. 27	Aug. 14	Aug. 28
Duncan Canal, Kupreanof Island.....					July 9	Aug. 31
Sumner Strait:						
Caldor and Eleopdam Bay, Prince of Wales Island.....					July 27	Aug. 30
Rocky Pass, Kuiu Island(?).....			July —	Oct. —	July 7	Aug. 23
Point Barrie Stream, Kupreanof Island.....					Aug. 17	Do.
Totem Bay, Kupreanof Island.....					July 1	Aug. 31
Red Bay, Kupreanof Island.....					July 4	Aug. 4
Stikine River.....					Aug. 1	Sept. 3
Zimovia Strait: Thoms (Old Village) Stream, Wrangell Island.....						
Clarence Strait:						
Salmon Bay, Prince of Wales Island.....					June 15	Sept. 4
Eagle Creek, Prince of Wales Island.....			Sept. 14	Sept. 27	do.	Sept. 6
Whale Passage, Prince of Wales Island.....			July 1	Sept. 1	do.	Sept. 10
Lake Bay, Prince of Wales Island.....	Aug. 15	Sept. 15			do.	Sept. 4
Coffman Cove, Prince of Wales Island.....					do.	Do.
Rocky Bay, Etolin Island.....					do.	Do.
Ratz Harbor, Prince of Wales Island.....					do.	Do.
Ernest Sound—						
Union Bay, Cleveland Peninsula.....					July 17	Aug. 14
Vixen Point, Cleveland Peninsula.....					Aug. 8	Aug. 26
Menefee Inlet, Etolin Island.....					July 25	Aug. 5
Point Warde, Cleveland Peninsula.....					June 27	July 28
Anon Creek, Cleveland Peninsula.....					June 15	Sept. 4
Doris Bay (?).....					Sept. 6	Sept. 8
Middle Arm (?).....					Sept. 11	Sept. 16
Sunny Point (?).....					Sept. 10	Do.
Meyers Stream, Cleveland Peninsula.....					Aug. 1	Sept. 3
Thorne Bay, Prince of Wales Island.....					do.	Sept. 4
Kasaan Bay—						
Karta Bay, Prince of Wales Island.....					Aug. 28	Sept. 3
Twelvemile Arm—Kina Stream, Prince of Wales Island.....					do.	Do.
Skowl Arm, Prince of Wales Island.....					Aug. 1	Sept. 5
Behm Canal						
Yes Bay, Cleveland Peninsula ^a						
Unuk River.....					Aug. 4	Aug. 29
Checats Stream ^b						
Tongass Narrows—						
Ward Cove, Revillagigedo Island.....					July 23	Sept. 6
Ketchikan Creek, Revillagigedo Island.....					Aug. 20	Sept. 5
Cholmondeley Sound.....	Aug. 1	Nov. 1	Aug. 5	Nov. 7	July 30	Oct. 30
Dora Bay, Prince of Wales Island.....					Aug. 3	Oct. 24
Peter Johnson Stream (Dolomi) Prince of Wales Island.....					June 30	Sept. 14
Moirs Sound—						
North Arm, Prince of Wales Island.....					July 13	Sept. 8
South Arm.....						
Keogan Stream, Prince of Wales Island.....					July 11	Sept. 6
Old Johnson Stream, Prince of Wales Island.....					July 13	Sept. 3
Nichols Passage—						
Blank Inlet, Gravina Island.....					Aug. 2	Aug. 29
Tain, Annette Island.....					Aug. 7	Sept. 3
Tamgass Harbor, Annette Island.....					Aug. 4	Aug. 29
Nadzaer, Annette Island.....					Sept. 7	Sept. 12
Revillagigedo Channel:						
George Inlet, Revillagigedo Island.....					July 6	Sept. 1
Nancy Haines (?).....					Sept. 14	Sept. 19
Duke Island.....					Aug. 11	Aug. 18

^a 1897, July 17 to August 7. 1899, July 14 to September 13. 1900, July 21 to September 17. ^b 1897, July 23 to August 2.

29. *Oncorhynchus tshawytscha* (Walbaum). *Chinook Salmon; King Salmon; Quinnat Salmon.*
(Pl. xxix and xxx.)

The chinook salmon is called king salmon or spring salmon in Alaska; spring or chinook salmon on Fraser River and Puget Sound; chinook, royal chinook, quinnat, or Columbia River salmon on the Columbia River, and Sacramento salmon in California. Where the Chinook jargon is spoken it is the *tyce*, which means king. Among the Russians it is called *tshavitch* or *tshavytscha*.

This is a salmon of wide distribution. It occurs on both coasts of the Pacific from Monterey Bay and China north into the Arctic Ocean, ascending all large streams. The most southern point on the California coast for which we have definite records is Monterey Bay, but its southern range doubtless extends somewhat farther down the coast. There is a record, on what authority we do not know, of its occurrence in the Ventura River, 300 miles south of San Francisco. However that may be, this important salmon is not uncommon in Monterey Bay, where considerable numbers are caught in spring and summer by trolling. In the Sacramento and Columbia rivers it is the principal salmon, far outnumbering all other species. It occurs in some numbers in other streams of Oregon and Washington, and is not uncommon in Puget Sound. It runs somewhat sparingly in the larger streams of British Columbia and Southeast Alaska, particularly the Fraser, Skeena, Nass, Stikine, and Taku.

Throughout Southeast Alaska the king salmon is probably not uncommon, although the catch has not been considerable until recently. It is said that this fish can be taken by trolling any month in the year about Admiralty Island, particularly in the vicinity of Killisnoo. In 1905 and again in 1906 it was particularly common about Ketchikan and in Tongass Narrows, where it was taken in seines. It is also taken near Chilkat and Chilkoot. Usually the king salmon make their appearance at the time of the run of the herring, upon which they largely feed, and they follow up the smelt also, being found wherever that species occurs in numbers. The principal river in Southeast Alaska into which the king salmon run is the Taku, and the salmon taken in the various places mentioned above probably enter that stream for spawning purposes.

In 1906, from July 15 to 20, 100 king salmon were taken in gill-nets operated by an Indian in the vicinity of Burroughs Bay. They were all very large, some of them reaching a weight of 89 pounds. It is said they can be taken in that locality as early as May 15. Usually the Wrangell cannery counts on getting 4,000 to 8,000 king salmon from the Stikine River each year.

In 1897, 350 king salmon averaging 16 pounds each were salted at Killisnoo.

In Copper River, which flows into Prince William Sound, and the larger streams tributary to Cook Inlet, there is a considerable run of king salmon. They are said not to run in Alitak Bay, on Kodiak Island. They are, however, taken at Karluk, and other places on Kodiak Island and also on Afognak Island and the islands of the Alaskan Peninsula, though at no place in any abundance. In Nelson Lagoon, in 1906, those first caught were taken June 15. They continued to run until July 18, July 1 to 18 being the height of the season. The fish caught there ran 15 to the barrel.

In the Ugashik River, in 1906, those first caught were taken June 4. The king, red, and dog usually come together. The run of that season, as for five seasons past, was poor.

The king salmon occurs, though not abundantly, in the Nushagak River. In 1906 it was first seen on June 7, and the run for the year was greater than usual and the fish were larger. Small king salmon are here sometimes put up under coho labels. They also occur in considerable numbers in the Yukon. Important fisheries supplying the local demand are operated at Dawson, Eagle City, and Rampart. Rampart is 900 miles above the mouth of the Yukon, and the run was on at that place September 10. Several were taken, each weighing 20 pounds or more. They were full of spawn.

Late in July king salmon have become common in the upper Yukon beyond the boundary, being found in the middle and lower waters a month earlier. During the summer of 1897 a number of fishermen employed gill-nets at Dawson, Northwest Territory, readily taking king salmon of large size. Many fish were found weighing 40 pounds and over, and the prices received for them were so high as to make the business quite profitable. This point is 1,300 miles from the sea. They are said to run up the river at least as far as Caribou Crossing, 2,000 miles from the sea. Mr. Hess found them in China Slough of the Tanana for seven to nine days toward the end of July and in the Tanana itself for three weeks. On July 14, 1904, he observed the first king salmon at the Central Telegraph Station on Goodpaster River, 63 miles below its head. They are said to go 25 miles farther up this stream and to be very abundant later in the season. Nelson says (1887):

This species is taken along the shores of Norton Sound immediately after the ice disappears in spring, my earliest date being June 6, 1877. On the lower Yukon, up, at least, to Anvik, the largest of these salmon run during the few days just preceding and following the breaking up of the ice and thence on to the end of the season they decrease gradually in size and quality. * * * At Anvik they begin running about the 12th of June and the season is virtually over by the middle of July. I was told that one example was taken at Anvik that weighed 140 pounds and that they sometimes weigh a third more than that.

Mr. Nelson does not regard this information as reliable. Mr. V. L. Derby in a letter dated January 19, 1907, reports that "a few king salmon rounded Point Barrow and entered the lagoons at Pargneck, the shooting station, in the spring of 1906. The natives caught a few in the fall of 1905 and summer of 1906."

One was seen by us at the cannery at Wrangell July 13, among many hundred humpbacks. A few were seen in the Taku Inlet cannery July 14. Two (1 male and 1 female) were examined at Pyramid Harbor, July 15. The male was 28 inches long and weighed 8 pounds; the female was 40.5 inches long and weighed 28 pounds.

A female seen at the Dundas Bay cannery July 24 was 34 inches long and weighed 17 pounds. The eggs of this fish were very immature. King salmon weighing 25 to 40 pounds were caught in sea-otter nets off Montague Island in December, 1894, and January, 1895.

Mr. Rutter saw one at Karluk that was 50 inches long and weighed 60.5 pounds. A female 2 feet 9 inches long, weighing 13 pounds and nearly ripe, was seined at Karluk August 4. Mr. A. B. Alexander saw one in 1888 in Nushagak that weighed 85 pounds. On July 18, 1900, Mr. Kutchin saw one at Kasilof which weighed 77 pounds.

Dr. Tarleton H. Bean says in "The Alaskan Salmon and Their Allies:"

Individuals weighing over 100 pounds are on record. At St. Paul, Kodiak, Mr. B. G. McIntyre weighed one which registered 87.5 pounds without its viscera, and the entire fish must have exceeded 100 pounds. Capt. William Kohl has recently told me that he once obtained reliable information in Cook Inlet of a salmon weighing about 140 pounds, and individuals of equal size are reported in the Yukon.

Mr. John N. Cobb has a record of one weighing 77 and two others each of 75 pounds, taken by trolling near Ketchikan in 1905, and one of 47 pounds taken at Juneau in 1906. He gives also the following information regarding fish from Bristol Bay:

WEIGHT AND MEASUREMENTS OF 51 KING SALMON EXAMINED AT THREE BRISTOL BAY LOCALITIES IN 1906.

Locality and date.	Number examined.	Sex.	Length.			Weight.			Total number examined.	Average length.	Average weight.
			Maxi- mum.	Mini- mum.	Average.	Maxi- mum.	Mini- mum.	Average.			
			Inches.	Inches.	Inches.	Lbs.	Lbs.	Pounds.			
Koggiang (July 12).....	18	♂	43	33.00	39.722	34	14.0	25.516	46	39.260	25.369
		♀	45	26.50	38.598	39	7.5	25.285			
Nushagak River (July 19)...	2	♂	38	34.00	36.000	21	14.0	17.500	2	36.000	17.500
Wood River (July 19).....	3	♂	31	29.75	31.666	15	10.0	12.333	3	31.666	12.333

Bean (1882) records this salmon from Kasilof River, Cook Inlet, and from the Yukon.

Gilbert says (1895) that at Departure Bay, May 10-13, 1890, young individuals were feeding on the herring (*C. pallasi*) and a number were taken on the trolling line. He says further:

At Unalaska, May 24-27, 1890, the run had hardly begun, though a few individuals were seen. A small pond near the stream which flows into the head of Captains Harbor was full of young salmon of this species, from 2 to 5 inches long, which took the fly greedily. June 3, at the mouth of the Nushagak River, Bristol Bay, an occasional individual was taken. A small run had come into the river a short time before our visit. On June 16 they were running abundantly at Unalaska, but they were not seen on later visits at this point or at Port Möller. It is worthy of note that their period of greatest abundance coincided in time with that of the herring, and their approach to the coast may be determined by the movements of the latter. Their annual appearance in large numbers in Monterey Bay, California, seems to be dependent on the run of anchovies.

The following notes have been furnished by Mr. John N. Cobb:

Considerable numbers are taken on hand-lines baited with herring on the herring grounds on the northern side of Kuiu Island. It is said that young king salmon 10 to 12 inches long can be taken in October on hand-lines from the wharves at Killisnoo. The Indians take large numbers of small kings in Florence Bay. A few are taken in gill-nets (9.5 inch mesh) at Orca, where they are packed with the red salmon. A few are obtained each year in the Copper River delta, where the run begins about May 6.

King salmon are found in many of the rivers of Alaska during the breeding season, being most abundant, so far as known, in the Unuk, Stikine, Taku, Nushagak, Kvichak, and Ugashik. The rest of the year they are found scattered pretty much all over the straits, sounds, and bays of Southeast Alaska,

and it is possible they might be found in other portions of Alaska at this season were they to be fished for. At this time they are feeding upon the herring, and, in Southeast Alaska, are especially abundant in the vicinity of Point Comano on Cleveland Peninsula, and in Seymour Canal, Taku Inlet, and Gastineau Channel. It is said that there was a run of king salmon in Snug Harbor, Tenakee Inlet, in the fall of 1905 and the spring of 1906, which was the first seen there for several years.

The season of 1905 witnessed the inception of a new branch of the salmon industry. About the middle of January king salmon were observed in the vicinity of Ketchikan, but it was not until January 23 that the first fish was brought to that place. News of a large run of fish having spread, there were soon a number of whites and Indians out in canoes catching the kings, which they located by watching the gulls, which would gather over the herring schools upon which the kings were feeding. As the herring were in shoal water, nets could be used in but few places, so trolling lines were brought into use. At first herring bait was employed, but it was soon discovered that a nickel trolling spoon would answer the purpose just as well. The vicinity of Point Comano and Point Stewart seemed to be favorite resorts for the fish, but they were to be found almost everywhere within a radius of 50 miles from Ketchikan. Several firms in Ketchikan early saw the possibilities of the business and soon had out steamers and launches collecting the fish from the fishing boats. Upon reaching Ketchikan they were packed in ice and shipped to Puget Sound ports. The fish averaged 25 pounds in weight. One was caught which weighed 77 pounds, while several were brought in which weighed 75 pounds each. About 25 per cent of the catch consisted of white-meated fish and 75 per cent of red-meated. For the former the fishermen were paid 25 cents each and for the latter 50 cents each. During the run, which lasted until May 18th, 271,644 pounds, valued at \$15,600, were shipped. A considerable quantity was also cured by the Indians for their own use, while some were consumed locally by the whites.

The Ketchikan dealers state that the king salmon were very delicate and would not stand such handling as a red salmon will, and at first many of them had to be classed as second-grade fish on account of being bruised in killing by the Indians.

For years the Indians have been catching kings in winter for their own consumption. In 1905 the run was unusually large. It was much smaller in 1906, in the vicinity of Ketchikan, at least.

The preparation of mild-cured king salmon in Alaska has been carried on for some years. Up to the year 1906 only spawning fish were so treated, but the big run in the neighborhood of Ketchikan during the winter of 1905 attracted the attention of Puget Sound salters, and this year there were a number of plants in operation, some of which handled the feeding fish. In May and June the Juneau and Douglas dealers paid 75 cents each for all red-meated kings weighing over 17 pounds, 35 cents for all under 17 pounds, and 20 cents for white-meated kings of any weight. These dealers estimated that there were about 7 white-meated kings to every 100 red-meated fish. The largest king handled at Juneau weighed 47 pounds, while by far the greater part ran over 17 pounds in weight. Tierces holding 800 pounds were used and about 50 fish were required to fill a tierce. In curing, the head was taken off and the entrails removed. The fish was then split down the middle and the backbone taken out, thus leaving the fish in two halves. After the blood vessels were scraped out the fish were put into ice water for about thirty minutes and then salted down in the tierces with fine (dairy) salt.

The number of king salmon required to the case (of 48 one-pound cans) varies somewhat, as shown by the following figures: Orca, 4.2 fish to the case; Dundas Bay, 4.5; Pyramid Harbor, 3.5; Taku, 2.8; Nushagak, 3; Kvichak River, 2.7; Naknek River, 5; Yes Bay, 2.5; Cook Inlet, 3.5; Kenai, 2.7; Kasilof, 3; Odiak, 4.5. Of the places mentioned, the largest fish appear to come to the Yes Bay cannery and the smallest to Naknek River. Too much credence, however, should not be given these figures.

A very curious and interesting fact has been noticed regarding the color of the flesh of the king salmon. In some individuals the flesh is red, in others white. In Columbia River fish it is usually that rich red or salmon color which is so highly prized, although even in that river a certain percentage of the fish are white-meated. In Alaska apparently a somewhat larger percentage are white-meated. Of 3,232 cases put up at Pyramid Harbor, 977 were white; of 4,375 cases at Taku, 1,225 were white or pink. These figures indicate that about 42 per cent of Alaska king salmon are white-meated. This, of course, keeps the commercial value of the fish from being what it otherwise would be.

As already stated, the king salmon of Southeast Alaska are taken chiefly by trolling. Considerable numbers, however, are taken in gillnets at Port Snettisham, Wrangell Narrows, Point Highfield, Pyramid Harbor, Taku, Kenai, Kasilof, and elsewhere. The gillnets used in this fishery are usually 9.5-inch mesh. In some places it is 8.5, 9, or 9.25. The nets vary from 50 to 250 fathoms long and from 20 to 30 meshes deep.

The king salmon is the least abundant of the five species found in Alaska. Commercially it ranks as the least important. The catch of 1906 was 267,387 fish, and the pack 60,357 cases valued at about \$223,286.

The future development of the king salmon fishery in Alaska will be in the large streams to the northward, particularly in those tributary to Bering Sea. It is probable that methods of conducting the fishery will be developed which will, in spite of the short season and other unfavorable conditions, permit large catches to be made in such streams as the Yukon and Kuskokwim.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR KING SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1904-1906.

NOTE.—The fact that the name of a river is given does not mean that fishing is carried on in the river itself; in many instances the fishing station is in the vicinity of the stream and its name has been employed in order more clearly to identify the stream. The dates given do not necessarily mean the beginning and ending of the run for each stream, as the fish may have been running for sometime before the cannery men were able to fish the stream and the pack may have been obtained and fishing stopped before the end of the run.

Waters.	1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Bering Sea.</i>						
Nushagak Bay <i>a</i>	June 8	Aug. 3	June 1	July 1	June 5	Aug. 3
Igushik River.....	June 12	June 27	June 15	June 20		
Kvichak River <i>b</i>	June 21	Aug. 3	June 13	Aug. 2	June 20	Aug. 7
Naknek River <i>c</i>	June 22	Aug. 2	June 14	July 30	June 21	July 31
Ugashik River <i>d</i>	June 26	Aug. 1	June 13	July 28	June 18	Do.
Ugagak River.....					June 16	July 25
Nelsons Lagoon.....					June 15	July 24
<i>Central Alaska.</i>						
Chignik Lagoon and River.....	June 8	Aug. 8				
Kodiak Island: Karluk <i>e</i>	June 6	July 15	June 6	July 14	June 2	July 7
Cook Inlet (Kasilof) <i>f</i>	May 27	Aug. 4	May 25	July 13	June 3	Aug. 13
Prince William Sound:						
Chenega Stream.....	July 2	July 30				
Bilys Hole.....	do	do				
Miners River.....	do	do				
Eyak Lake and River.....					May 12	July 30
Copper River <i>g</i>			May 15	July 25		Do.
Pete Dahl Slough.....	May 6	July 15			do	Do.
Gus Wilson Slough.....					do	July 12
Castle Slough.....					do	Do.
Peter Walhalla Slough.....	May 6	June 30			do	Do.
G. Stevens Slough.....	do	do			do	Do.
Martin River.....	do	July 10			do	Do.
Little River.....					do	July 1
Italian Flats.....	May 6	July 25			do	July 12
Big Bar.....	do	do				
Snag Point.....					May 12	June 30
Chilkat River.....	June 1	July 10			July 1	July 28
<i>Southeast Alaska.</i>						
Icy Strait: Pleasant Island.....					June 26	Sept. 18
Lynn Canal.....	June 15	Sept. 15			do	Sept. 22
Chilkoot Inlet and River.....	June 20	Sept. 17				
Chilkat Inlet and River <i>h</i>	June 4	July 20	June 27	July 15	June 29	Sept. 22
Tee Harbor.....	May 20	Sept. 7				
Lena Cove.....			May 15	Sept. 15		
Auk Bay.....	May 6	Sept. 7	May 8	June 20		
Point Louise.....			May 15	Sept. 15		
Chatham Strait: Funter Bay, Admiralty Island.....	June 1	Sept. 15			June 20	July 15
Stephens Passage.....	May 14	Sept. 7	May 8	June 30		
Taku Inlet <i>i</i>	May 6	do	do	do		
Port Snettisham.....	July 4	Aug. 4	do	do		
Seymour Canal.....					July	Oct. —
Wrangell Strait: Petersburg Creek, Mitkof Island.....				June 29	Sept. 16	
Stikine River <i>j</i>				May 17	July 27	May 26
Clarence Strait:						
Eagle Creek, Prince of Wales Island.....	July 5	Sept. 4			June 22	July 22
Ernest Sound—						
Point Warde, Cleveland Peninsula.....					June 27	July 28
Anan Creek, Cleveland Peninsula.....					July 2	July 23
Behm Canal—Yes Bay, Cleveland Peninsula.....			Apr. 13	Apr. 18		
Tongass Narrows—Ketchikan Creek, Revillagigedo Island <i>k</i>						

a 1900, June 12 to July 22.

b 1900, June 23 to July 25.

c 1900, June 18 to July 25.

d 1900, June 18 to June 29.

e 1900, June 5 to June 28.

f 1896, May 25 to June 25; 1897, May 26 to July 27; 1900, June 1 to July 10.

g 1890, May 5 to June 30; 1891, April 27 to June 30; 1892, cannery closed; 1893, May 2 to June 30; 1894, May 11 to June 30;

1895, May 15 to June 29; 1896, May 15 to June 30; 1897, May 10 to June 30.

h 1898, June 10 to July 10.

i 1896, May 25 to June 25; 1897, May 28 to June 28; 1900, May 8 to June 26.

j 1896, May 15 to June 22; 1897, May 15 to June 22; 1900, March 14 to June 28.

k 1892, July 15 to September 1.

As a food fish the coho occupies a high rank. The flesh is less firm than that of the red salmon and the scales fall off more readily when the fish is handled; and the flesh is rather pale in color, not possessing the deep red hue of the red salmon and the choice chinook. The flavor of the flesh, however, is excellent, and only the pale color keeps it from ranking with the best. The canners usually pay to the fishermen the same price for the cohos that they pay for reds.

The coho is canned as "coho" or "medium red." The first of these names is entirely proper and appropriate, as is also the second, unless possibly it might be objected to as suggesting that the contents of the can is really the red or sockeye salmon of a color somewhat less red than usual. To the trade, however, these two names have come to have a definite and well-understood meaning. They are not, so far as we are informed, ever applied to any other species, and we regard them as wholly satisfactory trade names.

Commercially the coho is at present, next to the king, the least important of the 5 species found in Alaska. In 1906 the total catch was 984,801 fish, yielding 113,054 cases, valued at \$392,251.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR COHO SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906.

NOTE.—The fact that the name of a river is given does not necessarily mean that fishing is carried on in the river itself; in many instances the fishing station is in the vicinity of the stream and its name has been used in order to locate the stream more clearly. The dates given do not necessarily mean the beginning and ending of the run for each stream, as the fish may have been running for some time before the cannery men were able to fish the stream and the pack may have been obtained and fishing stopped before the end of the season.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Bering Sea.</i>								
Nushagak Bay.....	June 21	July 24	June 25	Aug. 4	July 10	July 30	July 11	Aug. 4
Kvichak River.....	July 20	July 25	July 27	Aug. 3	June 17	July 28		
Naknek River.....							(a)	(a)
Ugagak River.....							(a)	(a)
Ugashik River.....					June 15	July 26		
<i>Central Alaska.</i>								
Chignik Lagoon and River.....	Aug. 3	Aug. 12						
Kodiak Island:								
Karluk.....	Aug. 25	Sept. 21	Aug. 21	Sept. 30	July 22	Sept. 25	Aug. 13	Sept. 12
Ahtak Bay.....			Aug. 27	Sept. 3	Aug. 22	Aug. 27	Aug. 7	Sept. 2
Cook Inlet (Kasilof).....	July 1	Aug. 10	Aug. 27	Aug. 4			July 16	Aug. 13
Prince William Sound ^b								
<i>Southeast Alaska.</i>								
Yakutat Bay.....			Aug. 29	Aug. 29				
Situk River.....			do	Oct. 2	Aug. 27	Sept. 27	Aug. 22	Sept. 25
Anka River.....			Aug. 30	Sept. 29	Aug. 29	Sept. 29	do	Do.
Ankau Slough.....			Aug. 27	Sept. 12	Aug. 21	Sept. 14	Aug. 14	Sept. 15
Ahrnklin River.....			Aug. 30	Oct. 3	Aug. 27	Sept. 27	Sept. 1	Sept. 13
Ahrnklin Slough.....					Sept. 14	Sept. 26		
Lituya Bay.....					Aug. 16	Aug. 16		
Surge Bay, Yakobi Island.....					July 25	Aug. 20	July 25	Aug. 11
Takamis Bay, Yakobi Island.....					July 29	Aug. 27	Aug. 11	Do.
Cape Edward, off Chicagof Island.....					Aug. 20	Aug. 24		
Portlock Harbor, Chicagof Island.....					Aug. 10	Aug. 10	Aug. 25	Aug. 25
Cross Sound: Taylor Bay.....					Aug. 27	Aug. 27		
Lisianski Strait.....							July 31	July 31
Kochtakeine (?).....					Aug. 6	Aug. 13		
Porcupine (?).....					Aug. 13	Aug. 27	Sept. 3	Sept. 3
Icy Strait:								
Dundas Bay.....					do	Sept. 13	Sept. 5	Sept. 17
Glacier Bay—Bartlett Bay.....	Aug. 20	Sept. 30			Aug. 26	Sept. 11	Aug. 28	Sept. 19
Pleasant Island.....			June 15	Oct. 8	June 22	Sept. 9	July 6	Sept. 13
Excursion Inlet.....							Sept. 8	Sept. 20
Port Frederick, Chicagof Island.....							Sept. 5	Sept. 5
Lynn Canal.....			June 25	Oct. 8			July 27	Sept. 23
Chilkoot Inlet and River.....			June 20	Sept. 17				
Chilkat Inlet and River.....			Aug. 23	Sept. 23	Aug. 20	Sept. 15	June 29	Sept. 22
Eagle River.....					July 15	do	July 4	Sept. 5
Lens Cove.....					July 1	Sept. 15		
Point Louise.....					do	do		
Auk Bay.....					Aug. 15	do		

^a Run too late.

^b 1891, August 4 to September 14.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR COHO SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906—Continued.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska—Continued.</i>								
Chatham Strait:								
Funter Bay, Admiralty Island.....			June 1	Sept. 15	July 11	Sept. 16	July 4	Sept. 5
Freshwater Bay, Chichagof Island.....			July —	Aug. —				
Basket Bay, Chichagof Island.....			July —	Aug. —				
Bay of Pillars.....					Aug. 30	Oct. 1		
North Arm, Kuiu Island.....			Aug. 28	Sept. 15			Aug. 15	Sept. 20
South Arm, Kuiu Island.....	Aug. 15	Nov. —					do.	Sept. 15
Tebenkof Bay—Kuiu Bay, Kuiu Island.....					Aug. 30	Sept. 30	do.	Sept. 20
Stephens Passage.....			July 25	Sept. 7	Aug. 15	Sept. 15		
Taku Inlet.....	Aug. 1	Oct. 1			do.	do.		
Port Snettisham.....					do.	do.		
Seymour Canal.....							July —	Sept. —
Frederick Sound:								
Saginaw Bay, Kuiu Island.....					Aug. 23	Oct. 2		
Hamilton Bay, Kupreanof Island.....			Aug. 29	Sept. 3				
Portage Bay, Kupreanof Island.....			Aug. 8	Aug. 8				
Cleveland Passage.....							July 17	Aug. 27
Keku Strait.....					Aug. 23	Oct. 2		
Wrangell Strait:								
Petersburg Creek, Mitkof Island.....			July 29	Sept. 16	Aug. 5	Sept. 9	Aug. 1	Sept. 13
Blind Point, Mitkof Island.....					July 1	Oct. 15	Aug. 14	Sept. 10
Duncan Canal, Kupreanof Island.....			July 28	Sept. 17	Aug. 8	Sept. 9	July 27	Aug. 25
Sea Otter Sound:								
Tuxekan, Prince of Wales Island.....							Aug. 25	Sept. 1
Tokheni Stream, Kosciusko Island.....			Sept. 1	Sept. 11	Sept. 15	Sept. 15		
Iphigenia Bay: Warm Chuck, Hegeta Island.....					Aug. 29	Sept. 14	Aug. 21	Sept. 3
Tonowek Bay:								
Sarkar, Prince of Wales Island.....	Aug. 14	Sept. 16	July 15	Sept. 24	July 10	Sept. 16	Aug. 28	Sept. 1
Nahakay, Prince of Wales Island.....							Aug. 29	Sept. 5
Gulf of Esquibel: Shineha Creek, Prince of Wales Island (?).....							Sept. 19	Sept. 19
San Alberti Bay:								
Stayne Chuck, Prince of Wales Island (?).....			Sept. 1	Oct. 8	Aug. 17	Sept. 13		
Klawak Inlet, Prince of Wales Island.....	Aug. 14	Sept. 24	Aug. 26	do.	Aug. 24	Sept. 14	Sept. 1	Sept. 26
Soda Harbor, Prince of Wales Island.....			Sept. 6	Sept. 24			do.	Do.
Big Harbor, Prince of Wales Island.....			Aug. 31	Sept. 23	Aug. 22	Sept. 14	do.	Do.
Cordova Bay:								
Sukkwai, Prince of Wales Island.....			Aug. 27	Sept. 27			do.	Do.
Hetta, Prince of Wales Island.....			Aug. 27	Sept. 24	Aug. 29	Sept. 14		
Nutkewa Inlet, Prince of Wales Island.....			Sept. 1	Sept. 21				
Hunter Bay, Prince of Wales Island.....			Aug. 1	Aug. 25	Aug. 17	Sept. 11		
Summer Strait:								
Shipley Bay, Kosciusko Island.....			Aug. 13	Sept. 1			Aug. 21	Sept. 3
Seclusion Harbor, Kuiu Island.....			Sept. 12	Sept. 18	Sept. 1	Sept. 8		
Rocky Pass, Kuiu Island (?).....			Aug. 28	Sept. 15	Aug. 23	Oct. 2	Aug. 10	Sept. 30
Point Barre Stream, Kupreanof Island.....			Aug. 3	Aug. 24	Aug. 5	Aug. 28	July 30	Aug. 23
Totem Bay, Kupreanof Island.....			Aug. 12	Sept. 6	Aug. 25	Aug. 25	Aug. 17	Aug. 24
Red Bay, Prince of Wales Island.....			Aug. 25	Aug. 28	Aug. 7	Sept. 7	Aug. 4	Aug. 31
Blind Slough, Mitkof Island.....			Sept. 1	Sept. 1				
Stikine River.....					July 29	Sept. 6	July 30	Aug. 4
Zimovia Strait:								
Olive Bay, Etolin Island.....					Aug. 25	Sept. 5	Aug. 10	Aug. 30
Thoms (old village) Stream, Wrangell Island.....	Aug. 5	Sept. 12					Aug. 1	Sept. 3
Clarence Strait:								
Salmon Bay, Prince of Wales Island.....			July 29	Sept. 15	July 1	Sept. 8	July 1	Sept. 4
Eagle Creek, Prince of Wales Island.....			Aug. 18	Sept. 4	do.	Sept. 27	do.	Sept. 6
Whale Passage, Prince of Wales Island.....					do.	Sept. 8	do.	Sept. 10
Lake Bay, Prince of Wales Island.....			Aug. 25	Sept. 15	June 25	Sept. 1	do.	Sept. 4
Coffman Cove, Prince of Wales Island.....							do.	Do.
Valdemar Bay, Prince of Wales Island.....			Sept. 9	Sept. 9				
Steamer Bay, Prince of Wales Island.....			Aug. 12	Aug. 21				
Rocky Bay, Prince of Wales Island.....			Aug. 1	Sept. 10	Aug. 7	Sept. 8	July 1	Do.
Ratz Harbor, Prince of Wales Island.....					June 25	Sept. 1	do.	Do.
Ernest Sound:								
Union Bay, Cleveland Peninsula.....			Aug. 8	Aug. 8	Sept. 2	Sept. 4	July 17	Aug. 14
Vixen Point, Cleveland Peninsula.....							Aug. 8	Aug. 26
Etolin Cove, Etolin Island.....							Aug. 25	Aug. 30
Menefee Inlet, Etolin Island.....							July 25	Aug. 5
Santa Anna Bay, Cleveland Peninsula.....								
Anan Creek, Cleveland Peninsula.....					July 1	Sept. 1	July 27	Aug. 27
Doris Bay (?).....							July 1	Sept. 4
Middle Arm (?).....							Sept. 6	Sept. 8
Midway Cove (?).....							Sept. 11	Sept. 16
Sunny Point (?).....							Aug. 14	Aug. 30
							Sept. 10	Sept. 16

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR COHO SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906—Continued.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska—Continued.</i>								
Clarence Strait—Continued.								
Meyers Stream, Cleveland Peninsula.....							Aug. 1	Sept. 3
Thorne Bay, Prince of Wales Island.....							do.	Sept. 4
Kasaan Bay—								
Karta Bay, Prince of Wales Island.....	Aug. 30	Sept. 20					Aug. 15	Sept. 3
Skowl Arm, Prince of Wales Island.....							Aug. 4	Sept. 6
Behm Canal—								
Naha Stream, Revillagigedo Island.....			July 15	Sept. 1				
Yes Bay, Cleveland Peninsula.....	Aug. 11	Sept. 17					Aug. 20	Sept. 15
Checats Stream.....	July 26	Sept. 7						
Smeaton Bay.....			Sept. 3	Sept. 3				
Tongass Narrows—Ward Cove, Revillagigedo Island.....								
	July 13	Sept. 7					July 23	Sept. 6
Cholmondeley Sound.....								
					Aug. 5	Nov. 7	July 30	Oct. 30
Dora Bay, Prince of Wales Island.....					Aug. 3	Sept. 5	July 31	Sept. 15
Peter Johnson Stream (Dolomi), Prince of Wales Island.....								
	July 28	Sept. 1	July 16	Sept. 15	July 19	Sept. 8	June 30	Sept. 14
Moira Sound—								
North Arm, Prince of Wales Island.....					Aug. 19	Sept. 12	July 13	Sept. 8
Shalclair, Prince of Wales Island.....					Aug. 25	Sept. 8		
Browns, Prince of Wales Island.....					Aug. 12	do.		
South Arm—								
Keogan stream, Prince of Wales Island.....			Aug. 4	Sept. 2	Aug. 11	Sept. 9	July 11	Sept. 6
Old Johnson Stream, Prince of Wales Island.....								
							July 13	Sept. 3
Nichols Passage—								
Gravina Bay, Gravina Island.....			Aug. 22	Sept. 1				
Bostwick Inlet, Gravina Island.....			Sept. 3	Sept. 7				
Hemlock Island, off Annette Island.....			Aug. 26	Sept. 9				
Tain, Annette Island.....			Aug. 4	Sept. 2	Aug. 3	Sept. 2	Aug. 8	Sept. 15
Tangas Harbor, Annette Island.....	Sept. 4	Sept. 4	Aug. 9	Sept. 13	Aug. 12	Sept. 1	July 24	Aug. 29
Nadyaer, Annette Island.....							Sept. 7	Sept. 8
Revillagigedo Channel:								
George Inlet, Revillagigedo Island.....	July 25	Sept. 6	July 7	Sept. 5			July 6	Sept. 1
Hassler Harbor, Annette Island.....			Aug. 28	Sept. 3				
Nancy Haines (?).....							Sept. 14	Sept. 19
Duke Island.....			Aug. 10	Sept. 10	Aug. 7	Sept. 1	Aug. 8	Aug. 31
Kah Shakes Cove.....							July 24	Aug. 23
Foggy Bay.....			Sept. 1	Sept. 3				

31. *Oncorhynchus nerka* (Walbaum) *Red Salmon; Redfish; Sockeye; Blueback Salmon.*
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This species also is of wide distribution. On the American coast its range extends from southern Oregon to Bering Sea. The most southern stream from which it has been reported is the Sacramento, from which it was recorded by Dr. Jordan in 1880, but it is not known whether he actually examined a specimen. In 1899 Mr. F. M. Chamberlain, of the Bureau of Fisheries, identified a single specimen which he obtained at Baird as belonging to this species. During the very extended study of the salmon of the Sacramento River by Mr. Rutter, no examples were seen by him. It is certain, therefore, that if this species of salmon occurs in the Sacramento River at all it is very rare.

The fishermen on the coast of Humboldt County, Cal., obtain a salmon which they call blueback or sockeye. The statistical report shows that the catch in 1899 was 21,600 pounds, and that of 1904 was 272,840 pounds. Whether these fish are really the blueback, or red, salmon is questionable. Eel River, Humboldt County, is the stream on which this fishery is located, and it has never been known as a blueback salmon stream. It is not known to have any lakes in its headwaters to which this species could resort for spawning purposes. Whether the blueback salmon occurs in it or not, therefore, must be regarded as a subject for future investigation. The same may be said regarding the Klamath River.

The Columbia is the most southern river in which this species is known to run in any numbers. Formerly, and up perhaps to about 1890, there was a considerable run in the Columbia, and important spawning beds existed in the headwaters of that river, particularly at Wallowa Lake in Oregon and the Payette lakes and the Sawtooth lakes in Idaho. A few bluebacks are seen at each of these lakes each season now, but they are only a pitiful remnant of the great schools that formerly came to them at spawning time. North of the Columbia the next blueback salmon stream is the Quiniault on the coast of

Washington. At one time this was said to be an excellent blueback stream, able to supply to the Indians of the Quinault Reservation a large part of their food. It is said that there is still a small run here. There is also a small run in Ozette Lake, just south of Cape Flattery.

Of the streams tributary to Puget Sound the only ones in which the sockeye, as this salmon is usually called in that region, is known to run are the Lake Washington system of lakes, the Skagit and, possibly, the Snohomish, the Stillaguamish, and the Nooksak. The only one of these, however, in which there is any considerable run is the Skagit, which the fish ascend to reach Baker Lake for spawning purposes. Doubtless the greatest of all the sockeye streams is the Fraser River. Ever since the early days of the salmon canning industry on our western coast the Fraser has been famous for the enormous runs of sockeyes which ascend that great river to the lakes at its headwaters.

Going northward from the Fraser we find several streams in British Columbia in which the sockeyes run in considerable numbers. The principal of these are the Skeena, Rivers Inlet, Naas, Lowe Inlet, Dean Channel, Namu Harbor, Bella Coola, Smith Inlet, Alert Bay, and Alberni Canal. It is by far the most abundant and most important salmon in British Columbia waters. In Alaska, where it is known as the reddish, red salmon, or sockeye, it is abundant and runs in great numbers in all suitable streams. In Southeast Alaska the following are the most important red salmon streams: Naha, Boca de Quadra, Yes Bay, Nowiskay, Keegan, Peter Johnson, Klawak, Hessa, Hetta, Hunter Bay, Chilkat, Taku, Chilkoot, Karta, Thorne Bay, Stikine, etc.; in Central Alaska, Alek, Copper, Afognak, Karluk, Alitak, Chignik, Knik, and Sushitna; in the Bristol Bay region, the Ugashik, Naknek, Kvichak, Nushagak, and Wood. The red salmon is said to ascend the Yukon, at least to Caribou Crossing, but we have seen no specimens from that river and do not know whether there is any considerable run in it. Nor do we know whether the species occurs in the Kuskokwim, the Kobuk, or any stream north of the Nushagak. On the Asiatic side the red salmon is known to occur at Bering Island and in all suitable streams south to Japan.

This species of salmon is peculiar in that it rarely or never ascends a stream that has not one or more lakes at its headwaters. Its spawning beds are invariably in small streams tributary to lakes or, rarely, in the lakes themselves. No red salmon is known to have spawned in any stream not connected with a lake. Some have been seen occasionally in the lower part of a stream which had no lake in its course, but it is believed such individuals soon discovered their mistake and promptly returned downstream in search of the proper water. The only instances of this kind which have come under the personal observation of the senior author are the following: In August, 1903, while at Sitka, he saw a red salmon speared by an Indian in Indian River near the bridge, which, however, is only a short distance above the mouth of the stream; it is understood there is no lake in this stream. The other case is that of Gold Fork, a tributary of Payette River, Idaho. While at Payette Lake in September, 1894, he learned, on what he believes to be entirely trustworthy evidence, that red salmon are sometimes seen in the mouth of that stream, but that they soon return and ascend the main fork of the Payette, which comes from Big Payette Lake, in whose inlet there were formerly important spawning beds. The origin and significance of this peculiar habit are not known. The problem is one worthy of investigation.

The red salmon is the neatest and most symmetrical of the salmon. In the sea, or when fresh run, it is clear sky blue on the back and upper part of the sides, shading to clean silvery white below and on belly. Soon after entering the river for the purpose of spawning, the color of the head changes to a rich olive, the back and sides to crimson and finally to a dark blood red, richest in the males, and the belly a dirty white. Some of the scales become dark edged and the middle of the side shows the darkest red, but unevenly. At the same time the flesh becomes spongy, the scales embedded, the back somewhat humped, and the jaws hooked and otherwise distorted.

The run of the red salmon in Alaska begins usually in June; in Bering Sea and Central Alaska early in June or even in May, while in Southeast Alaska it is one to three weeks later. The earliest recorded date we have is May 6, for Eyak and the Copper River region. In Bering Sea the run is usually over by the end of July, in Central Alaska and Prince William Sound by the end of August, and in Southeast Alaska by the 10th of September or earlier. The period of the run of red salmon in different parts of Alaska, so far as the records show it, is given in the table on page 254.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR RED SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906.

NOTE.—The fact that the name of a river is given does not necessarily mean that fishing is carried on in the river itself, in many instances the fishing station is in the vicinity of the stream and its name has been used in order to locate the station more clearly. The dates given do not necessarily mean the beginning and ending of the run for each stream, as the fish may have been running for some time before the cannerymen were able to fish the stream and the pack may have been secured and fishing stopped before the end of the run.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Bering Sea.</i>								
Nushagak Bay.....	June 20	July 25	June 8	Aug. 4	June 5	July 28	June 5	Aug. 4
Igushik River.....			June 28	July 28	June 21	July 14	June 16	July 20
Wood River.....			July 1	July 31			June 22	July 27
Kvichak River.....	June 23	Aug. 1	June 21	Aug. 5	June 13	Aug. 2	June 20	Aug. 7
Naknek River.....	June 18	July 28	June 22	Aug. 2	June 14	July 30	June 21	July 31
Ugaguk River.....	July 1	July 25	June 25	July 25	June 23	July 25	June 15	July 25
Ugashik River.....	June 21	July 29	June 26	Aug. 1	June 13	July 28	June 18	July 31
Nelsons Lagoon.....							June 15	July 24
<i>Central Alaska.</i>								
Chignik Lagoon and River.....	June 6	Aug. 19	June 8	Aug. 14	June 10	Aug. 13	June 7	Aug. 14
Kodiak Island:								
Karluk.....	June 4	Sept. 21	June 6	Sept. 30	June 5	Sept. 25	June 15	Sept. 13
Red River.....			June 1	July 27	May 29	July 17	June 7	July 15
Little River.....	June 8	Aug. 13	May 30	July 24	May 27	July 19	June 8	July 7
Alitak Bay.....			June 15	Sept. 3	June 18	Aug. 21	July 3	Sept. 4
Koshuak.....			May 30	June 17				
Uganik River.....			June 5	Aug. 3	June 12	July 5	June 16	July 17
Waterfalls.....					July 7	Aug. 8	July 13	Aug. 27
South End.....			Aug. 2	Aug. 10				
Cook Inlet (Kasilof).....	June —	Aug. 10	May 27	Aug. 4	May 28	July 13	June 3	Aug. 13
Prince William Sound:								
Chonega Stream.....			July 2	July 30			July 20	Aug. 20
Billys Hole.....			do.	do.			July —	Aug. —
Miners River.....			do.	do.			July —	Aug. —
Ishman River.....					July 27	Aug. 2		
Eyak Lake and River.....			May 6	July 18	June 10	July 28	May 12	July 30
Mountain Slough.....							do.	Do.
Copper River.....					May 15	July 25	do.	June 30
Pete Dahl Slough.....			May 6	July 3			do.	Do.
Gus Wilson Slough.....							do.	July 12
Castle Slough.....			May 6	July 12				
Peter Walhalla Slough.....			do.	June 30				
G. Stevens Slough.....			do.	do.				
Martin River.....			do.	July 10	May 15	July 25	May 12	Do.
Little River.....							do.	Aug. 1
Italian Flats.....			May 6	July 25			do.	July 12
Big Bar.....			do.	do.				
Snag Point.....							May 12	June 30
Chilkat River.....			June 1	July 10			July 1	July 28
<i>Southeast Alaska.</i>								
Yakutat Bay.....							June 12	June 26
Situk River.....			June 15	July 30	June 7	Aug. 9	June 1	Aug. 8
Ankau River.....			July 5	Aug. 2	June 20	July 26	June 20	July 31
Ankau Slough.....			July 10	Aug. 1	June 12	Aug. 4	June 18	Aug. 9
Ahrnklin River.....			July 6	Aug. 17	June 21	July 5	June 4	Do.
Lituya Bay.....					Aug. 16	Aug. 16		
Surge Bay, Yakobi Island.....			June 22	Aug. 24	June 20	Aug. 29	June 26	Aug. 11
Takanis Bay, Yakobi Island.....					do.	do.	do.	July 22
Cape Edward, off Chicagof Island.....			June 22	Aug. 24	do.	do.	July 4	July 11
Portlock Harbor, Chicagof Island.....					do.	do.	Aug. 25	Aug. 25
Redoubt Bay, Baranof Island.....			June 22	Aug. 24				
Necker Bay, Baranof Island.....							June 15	July 25
Redfish Bay, Baranof Island.....			July 20	Aug. 20	July 15	Aug. 10	do.	Aug. 10
Cross Sound:								
Cape Spencer.....							June 30	July 2
Taylor Bay.....			Aug. 12	Aug. 24	June 21	Aug. 27	July 25	Aug. 28
Lisianski Strait.....					July 28	Aug. 3	do.	July 31
James Bay (?).....					July 27	July 29		
Kohtakelne (?).....					June 20	Aug. 13	June 26	Aug. 1
Porcupine (?).....					June 25		July 9	July 9
Icy Strait:								
Dundas Bay.....			June 22	Aug. 25	June 20	Aug. 3	June 26	July 30
Glacier Bay—Bartlett Bay.....	June 25	Aug. 7			June 21	July 30	June 28	July 31
Pleasant Island.....			June 15	Oct. 8	June 22	Sept. 15	July 1	Aug. 23
Lynn Canal.....			June 25	do.			June 29	Sept. 22
Chilkoot Inlet and River.....	July 12	Aug. 22	July 10	Sept. 17	July 15	Aug. 15	do.	Sept. 10
Chilkat Inlet and River.....	July 25	Sept. 1	June 24	Sept. 23	June 27	Sept. 15		

^a 1891, June 16 to July 13.

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR RED SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906—Continued.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska</i> Continued.								
Lynn Canal—Continued.								
Eagle River.....			July 1	Sept. 7	July 1	Sept. 15	June 21	Sept. 5
Tea Harbor.....								
Lena Cove.....					July 1	Sept. 15		
Point Louise.....					do.	do.		
Auk Bay.....			June 25	Sept. 7	do.	Aug. 25		
Chatham Strait:								
Funter Bay, Admiralty Island.....			June 1	Sept. 15	June 19	Sept. 16	June 21	Do.
Basket Bay, Chichagof Island.....			June 22	Aug. 25				
Sitkoh Bay, Chichagof Island.....			do.	do.				
Peril Strait.....			July —	Aug. —				
Red Bluff Bay, Baranof Island.....					July 10	Aug. 10	June 20	Aug. 30
Gut Bay, Baranof Island.....			July 1	Aug. 25	June 30	do.	do.	Do.
Bay of Pillars—South Arm, Kuiu Island.....	June 25	Aug. 7	July 9	Aug. 10	July 10	Aug. 20	June 25	Do.
Tebenkof Bay:								
Aleck Stream, Kuiu Island.....			June 19	July 25	June 15	Aug. 1	June 10	July 20
Kuiu Bay, Kuiu Island.....			June 25	Sept. 7	July 1	Aug. 25		
Stephens Passage:								
Taku Inlet.....	June 30	Aug. 12	July 1	do.	do.	do.		
Port Snettisham.....	July 9	July 27	July 4	Aug. 4	do.	do.		
Frederick Sound:								
Portage Bay, Kupreanof Island.....			Sept. 1	Sept. 1				
Cleveland Passage.....							July 17	Aug. 27
Wrangell Strait: Petersburg Creek, Mitkof Island.....			June 29	Aug. 4	June 26	Aug. 9	July 3	Aug. 4
Duncan Canal, Kupreanof Island.....			July 5	Aug. 26	June 27	Aug. 17	July 2	Aug. 11
Sea Otter Sound: Tokhini Stream, Kosciusko Island.....			July 12	Aug. 1	July 12	July 30		
Iphigenia Bay: Warm Chuck, Hecla Island.....			July 9	Sept. 1	July 8	Aug. 31	July 14	Aug. 22
Tonowek Bay:								
Sarkar, Prince of Wales Island.....	June 19	Aug. 4	June 7	Sept. 20	June 13	Aug. 22	June 15	Aug. 4
Nahakay, Prince of Wales Island.....					July 6	Aug. 17		
San Alberti Bay:								
Klawak Inlet, Prince of Wales Island.....	June 17	Aug. 24	June 14	Aug. 25	June 14	Aug. 23	June 20	Aug. 29
Soda Harbor, Prince of Wales Island.....					Aug. 29	Sept. 11		
Cordova Bay:								
Hetta, Prince of Wales Island.....	June 17	Aug. 23	June 14	Sept. 10	June 14	Sept. 9	June 20	Sept. 3
Klaskas Inlet, Prince of Wales Island.....			July 13	do.	July 12	Aug. 20		
Hunter Bay, Prince of Wales Island.....			do.	do.	July 10	do.	July 3	Aug. 13
Hessa Inlet, Prince of Wales Island.....			Aug. 15	do.	July 20	do.		
Nicobis Bay, Prince of Wales Island.....			July 13	do.	July 10	do.	July 13	Aug. 5
Summer Strait:								
Shipley Bay, Kosciusko Island.....	June 27	Aug. 14	July 4	Aug. 25			July 8	July 31
Calder and Eleopdan Bay, Prince of Wales Island.....			July 28	Sept. 28				
Point Barrie Stream, Kupreanof Island.....			June 26	Aug. 20	June 27	Aug. 25	July 1	Aug. 23
Red Bay, Prince of Wales Island.....	July 5	Aug. 5	June 27	Aug. 19	do.	Aug. 22	June 29	Aug. 31
Totem Bay, Prince of Wales Island.....			Aug. 28	Aug. 28				
Blind Slough, Mitkof Island.....			Sept. 1	Sept. 1				
Stikine River.....					June 22	Aug. 24	July 4	Aug. 4
Zimovia Strait: Thoms (old village) Stream, Wrangell Island.....	June 26	Aug. 1					June 20	July 31
Clarence Strait:								
Salmon Bay, Prince of Wales Island.....	June 18	July 27	June 27	Aug. 15	June 25	Sept. 1	June 15	Sept. 4
Eagle Creek, Prince of Wales Island.....			July 5	Aug. 30	June 30	do.	June 22	Do.
Whale Passage, Prince of Wales Island.....					July 1	do.		
Lake Bay, Prince of Wales Island.....			July 1	Aug. 15	do.	do.	July 1	Sept. 4
Valdemar Bay, Prince of Wales Island.....			Aug. 12	Aug. 14				
Rocky Bay, Etohin Island.....			July 27	Aug. 27	July 19	Aug. 18	July 1	Do.
Ratz Harbor, Prince of Wales Island.....							July 30	Aug. 11
Ernest Sound—								
Union Bay, Cleveland Peninsula.....			Sept. 8	Sept. 8				
Point Ward, Cleveland Peninsula.....							July 27	July 28
Anan Creek, Cleveland Peninsula.....					July 1	Sept. 1	July 2	July 23
Meyers Stream, Cleveland Peninsula.....							July 17	Sept. 3
Thorne Bay, Prince of Wales Island.....							Aug. 1	Sept. 4
Kasaan Bay—								
Karta Bay, Prince of Wales Island.....	June 19	Aug. 20	July 9	July 17			June 13	Aug. 17
Twelvemile Arm, Kina Stream, Prince of Wales Island.....							June 18	Do.
Skowl Arm, Prince of Wales Island.....					Aug. —	Sept. —	do.	Sept. 5
Behm Canal—								
Helm Bay, Cleveland Passage.....							July 23	July 29
Naha Stream, Revillagigedo Island.....			July 1	Sept. 21				
Yes Bay, Cleveland Peninsula.....	July 14	Sept. 17	July 16	Aug. 19			July 20	Aug. 20
Chiekamin River.....			Aug. 15	Aug. 22				
Checats stream.....	July 13	Aug. 15	July 11	Aug. 17			July 17	Aug. 3

THE BEGINNING AND ENDING OF COMMERCIAL FISHING FOR RED SALMON AT VARIOUS FISHING STATIONS IN ALASKA, 1900 AND 1904-1906—Continued.

Waters.	1900.		1904.		1905.		1906.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
<i>Southeast Alaska—Continued.</i>								
Clarence Strait—Continued.								
Tongass Narrows—Ward Cove, Revillagigedo Island.....	.....	Aug. 23	Aug. 5	Aug. 11	.....	.....	July 23	Sept. 6
Cholmondeley Sound.....	.....	.....	July 26	Aug. 7	Aug. 5	Sept. 1	July 30	Sept. 5
Dora Bay, Prince of Wales Island.....	.....	.....	July 9	Aug. 20	July 11	.....	July 11	Sept. 6
Peter Johnson Stream (Dolomi), Prince of Wales Island.....	July 7	Sept. 1	July 13	Sept. 13	.....	Sept. 2	June 30	Do.
Moirs Sound—								
North Arm, Prince of Wales Island.....	.....	.....	July 14	Aug. 22	.....	Sept. 7	July 13	Sept. 8
Shalclair, Prince of Wales Island.....	.....	.....	.....	.....	July 19	Aug. 24	.....	.....
Browns, Prince of Wales Island.....	.....	.....	.....	.....	July 29	Aug. 16	.....	.....
South Arm—								
Kegan Stream, Prince of Wales Island.....	.....	.....	July 12	Sept. 2	July 11	Sept. 7	July 11	Sept. 6
Nowiskay Stream, Prince of Wales Island.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Johnson Stream, Prince of Wales Island.....	.....	.....	.....	.....	.....	.....	July 13	Sept. 3
Nichols Passage—								
Bostwick Inlet, Grayina Island.....	.....	.....	Sept. 3	Sept. 7	.....	.....	.....	.....
Tain, Annette Island.....	.....	.....	July 15	Sept. 9	July 11	Aug. 28	July 11	Aug. 31
Tamgas Harbor, Annette Island.....	July 7	Sept. 1	July 16	Aug. 31	.....	.....	July 10	Aug. 21
Revillagigedo Channel:								
George Inlet, Revillagigedo Island.....	July 8	Aug. 1	July 7	Sept. 5	.....	.....	July 6	Sept. 1
Carroll Inlet, Revillagigedo Island.....	.....	.....	Aug. 14	Aug. 21	.....	.....	.....	.....
Thorne Arm, Revillagigedo Island.....	.....	.....	.....	.....	.....	.....	Aug. 24	Aug. 24
Hassler Harbor, Annette Island.....	.....	.....	Aug. 28	Sept. 3	.....	.....	.....	.....
Duke Island.....	.....	.....	July 16	Aug. 26	July 12	Sept. 1	.....	Aug. 31
Boca de Quadra.....	July 12	Aug. 31	July 9	Aug. 27	.....	.....	.....	Aug. 26
Kah Shakes Cove.....	July 10	Aug. 15	.....	.....	.....	.....	July 24	Aug. 23

Although the red salmon run is somewhat later than that of the king, the two species are sometimes found together. Writing of his observations in 1890, Dr. Gilbert says:

It appeared constantly associated with the king salmon. It was taken by trolling in Departure Bay, Vancouver Island, May 10 to 13; was seined in small numbers at Unalaska May 24 to 27, and was abundant there June 16. It had not begun to run at Nushagak June 3, but the young with parr marks still evident, ranging in size from 95 to 115 mm., were very abundant. These were doubtless descending the rivers to the sea and were probably about 20 months old. On July 5, young averaging slightly larger than the above were taken in salt water at Herendeen Bay, Alaskan Peninsula. These ranged from 120 to 130 mm. in total length. The color is deeper and less silvery than in the Nushagak examples and the parr marks have almost wholly disappeared.

The beginning of the run in any given stream is fairly constant, the variation being within narrow limits. The duration of the run is for a shorter period in the northern region than it is farther south. In Bristol Bay and Central Alaska it lasts only six weeks or less, while in Southeast Alaska it continues about two months.

The number of red salmon running in any given stream is constant from year to year only within rather wide limits. It is believed by most fishermen and cannerymen that every fourth year any given stream is apt to have a larger run than in any of the three other years of the series. In a general way this belief seems to be borne out by statistics; when specific cases are examined, however, the rule appears of doubtful application. For example, the catch of red salmon in the Ugashik River for the last six years has been as follows: 769,002 fish in 1901; 1,640,973 in 1902; 1,703,536 in 1903; 564,492 in 1904; 432,779 in 1905; and 152,140 in 1906. As the run was large in 1902 it should have been large in 1906, but it was the smallest ever known. Judging from the run of 1903, that for 1907 ought to be a large one. Information regarding it will be awaited with interest.

In Nushagak Bay and Wood River the run was very large in 1905, four traps in Wood River furnishing over 800,000 fish, while many thousands more were turned loose. In 1906 these same traps produced only about 200,000 fish, and three additional traps operated in the same region produced about 100,000 more, giving a total for Wood River for 1906 of about 300,000 as against more than 800,000 for 1905.

Although the price of red salmon was higher in 1906 than in 1905, and every effort was made to secure a large pack in the Bristol Bay region, the total number of red salmon cases fell 120,000 short of the pack of 1905. There are, however, so many factors entering into the conditions which determine the size of the pack in Bristol Bay that it is not safe to make any positive statement as to whether the catch has reached its limit. As has been said by Jordan and Evermann, "A wise administration of the fisheries will permit the taking of the largest number of fish compatible with the maintenance of the supply, and will permit their capture by the cheapest method which is not wasteful." But when it becomes apparent that the run is decreasing and that the fishery is permanently impaired, the catch should in some way be limited and ample opportunity be given to rehabilitate the fishery.

In size the red salmon ranks third among the five Pacific species of the genus. During the recent investigations a total of 1,390 red salmon from as many different places as possible were measured and weighed. The results, which are given in detail in the accompanying table, may be summarized as follows: For the males—Maximum length, 32 inches; minimum, 15.5; average, 27.81. Maximum weight, 11 pounds; minimum, 1.75; average, 7.43. For the females—Maximum length, 30 inches; minimum, 20.25; average, 24.87. Maximum weight, 11 pounds; minimum, 2; average, 5.78. For both males and females—Average length, 26.36 inches; average weight, 6.57 pounds. It is therefore safe to say that the red salmon of Alaska averages a trifle more than 6.5 pounds in weight.

At Chignik Bay is occasionally taken a small red salmon locally known as the "Arctic salmon" which is considerably smaller than the average for that region. On August 9, 1903, the senior author found and examined at the two canneries on Chignik Bay 13 examples of this fish, 12 of the 13 being males. The maximum and minimum lengths of the males were 19.38 and 15.86 inches, and the average 17.35; extreme weight 2.71 and 1.71 pounds, average 2.2 pounds. The single female was 22.63 inches long and weighed 4.63 pounds. These fish are not a different species, but evidently merely precocious individuals such as are found among the chinook salmon on the Columbia River, where mature small males are not infrequent. The fact that all but one of these so-called "Arctic salmon" were males shows them to be dwarfs of the same character. The opinion of local fishermen that this small salmon is peculiar to Chignik Bay is not borne out by the facts, as similar small fish were seen at Alitak, Karluk, and other places.

In various small lakes in Idaho, Oregon, Washington, and British Columbia is found a dwarf form of the Alaska red salmon known variously as small redfish, little redfish, Kennerly's salmon, or walla. The list of lakes in which this fish is known to occur is as follows: Alturas, Pettit, Redfish and Big Payette lakes in Idaho; Wallowa Lake in Oregon; Washington, Sammamish, Ozette, and possibly, American and Chelan lakes in Washington; Chiloweyuck, Nicola, François, Fraser, Okanagan, and Kootenai lakes in British Columbia. And recently during the investigations conducted by Mr. Chamberlain in the vicinity of Loring, Alaska, 2 or 3 examples of the little redfish were found in Patching Lake. This is a small lake in the Naha basin. In its outlet is a falls which fish from the sea can not ascend. Redfish fry from the Fortmann Hatchery had been planted in the lake, and it can not, therefore, be definitely known whether this specimen was one of the planted fish, dwarfed by the unfavorable environment, or one of a native race or form long landlocked in the lake.

The so-called little redfish does not appear to differ structurally from the larger form. It is mature, however, both males and females, at a length of a foot or less, and, like the ordinary red salmon, spawns only once, after which it dies. Recent observations by the senior author, and consideration of all the known facts concerning these little redfish, convince him that they do not come up from the sea, but are landlocked in the lakes in which they occur.

Next to the humpback the red is the most abundant salmon in Alaska—indeed, it is probable that, during the last 20 years, it has been no less numerous than the humpback. Commercially it is by far the most valuable salmon in Alaska. The total catch of 1906 was 19,536,761 fish, representing 1,540,856 cases, valued at \$5,720,291. The total number of salmon of all species handled in Alaska in 1906 was 31,756,335, representing 2,341,587 cases, valued at \$8,152,665. From these figures it is seen that the red salmon constitute more than 61 per cent of the catch, 65 per cent of the pack, and 70 per cent of the value. And in every year previous to 1906 the red salmon constituted even a larger proportion of the entire catch, as the utilization of the cheaper species has developed only within recent years.

LENGTHS AND WEIGHTS OF RED SALMON.

Locality and date.	Fish examined.	Sex.	Length.			Weight.			Total fish examined.	Average length.	Average weight.
			Maxi-mum.	Mini-mum.	Average.	Maxi-mum.	Mini-mum.	Average.			
			Inches.	Inches.	Inches.	Lbs.	Lbs.	Pounds.			
Nushagak.....	93	♂	30.00	22.75	27.63	11.00	4.00	7.793	121	27.127	7.466
	28	♀	29.00	21.25	25.45	85.00	4.00	6.383			
Koggingung.....	121	♂	31.00	25.00	28.589	10.00	5.00	7.59	201	27.470	7.225
	80	♀	29.00	24.5	25.779	9.00	5.00	6.673			
Wood River.....	76	♂	29.00	22.5	26.569	9.5	4.00	6.740	100	25.97	6.25
	24	♀	26.25	20.5	24.072	6.5	2.00	4.667			
Ugagak River.....	74	♂	32.00	26.00	28.629	9.00	6.00	7.949	156	27.85	7.636
	82	♀	30.00	25.75	27.167	9.75	5.00	7.414			
Naknek River.....	52	♂	30.5	26.5	28.58	9.25	6.5	8.198	100	27.74	7.63
	48	♀	29.00	23.00	26.828	11.00	5.5	7.046			
Ugashik River.....	76	♂	30.50	26.00	28.605	10.00	6.00	7.99	128	27.771	7.361
	52	♀	29.00	24.5	26.55	7.5	4.00	6.44			
Chignik, Aug. 9.....	80	♂	30.35	20.5	30.18	10.5	3.5	8.48	154	26.83	7.51
	74	♀	29.25	21.5	23.054	8.5	4.4	6.47			
Karluk, Aug. 15.....	79	♂	27.25	15.5	25.19	7.87	1.75	5.68	200	24.397	5.08
	121	♀	27.00	20.25	23.88	6.5	2.5	4.685			
Pyramid Harbor, July 15.....	17	♂	28.75	24.5	26.97	8.00	6.00	7.11	31	26.773	7.056
	14	♀	28.25	24.25	26.535	7.75	6.00	6.98			
Klawak, Aug. 25.....	11	♂	28.75	19.5	25.12	7.00	3.00	5.09	83	24.96	4.09
	72	♀	26.25	20.75	23.38	6.5	3.00	3.944			
Hotta Bay, Aug. 9.....	13	♂	26.5	22.5	22.94	7.00	4.00	5.48	102	23.60	4.825
	89	♀	26.00	21.00	23.705	6.00	3.00	4.73			
Karta Bay, July 10.....	11	♂	29.00	26.5	27.545	8.5	6.00	7.21	14	27.32	7.000
	3	♀	27.00	26.00	26.5	6.5	6.00	6.35			

32. *Salmo clarkii* (Richardson). *Alaska Cutthroat Trout*. (Pl. xv, fig. 1, and pl. xxxvii.)

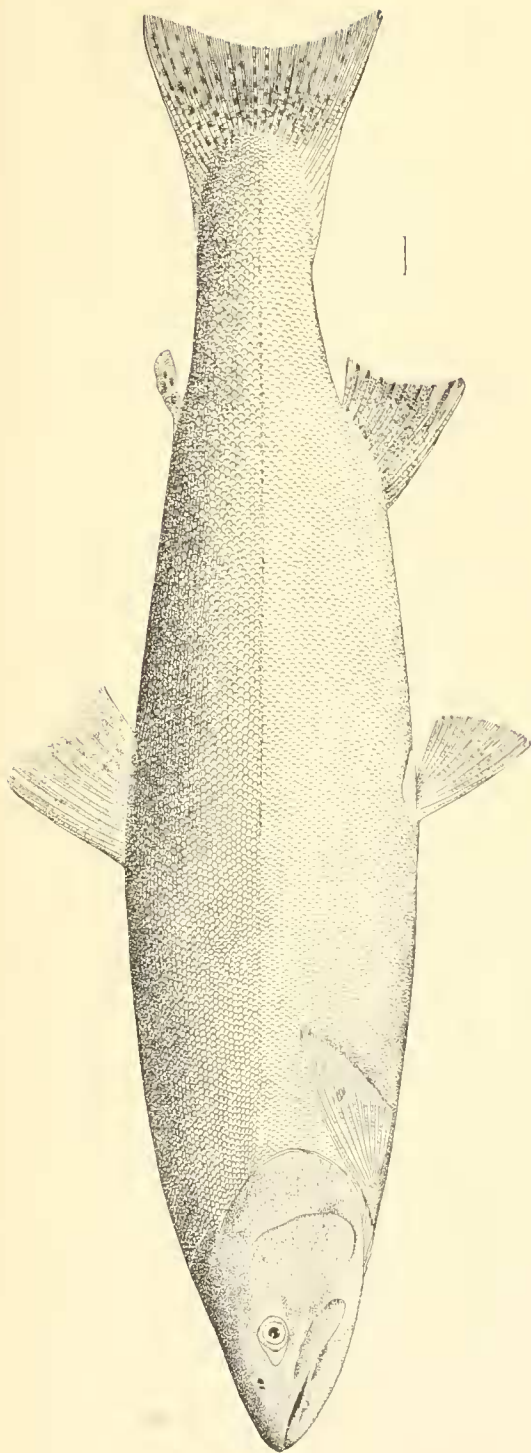
In 1881 Dr. Bean recorded this trout as *Salmo purpuratus* from Sitka, St. Paul (Kodiak Island), and "northern Alaska." Not until the investigations were made on which this report is based had any other specimens been recorded from Alaska or any Alaskan specimens come into the hands of any ichthyologist. Doubtless anglers and others knew of the presence in Alaska of a species of cutthroat trout. Indeed, officers and members of the civilian staff of the Fisheries steamer *Albatross* state that they have found cutthroat trout at various places in Southeast Alaska and that specimens were forwarded to the Bureau. These, however, seem to have been lost en route, as they were never received at Washington.

During the recent investigations cutthroat trout were obtained at the following places: San Mateo Lake near Union Bay, Vancouver Island (June 22); lake at Courtney, Union Bay (June 22); Karta Bay stream (July 11); Pablos Falls, Freshwater Bay (July 25); Silver Bay Creek near Sitka (July 29); Klawak Creek (August 26), and Naha stream near Loring (August 30). Other specimens were obtained in the vicinity of Loring in 1903, and again in 1904 and 1905, and numerous fine specimens were collected in Lake McDonald and vicinity by Mr. J. S. Bureham in 1905.

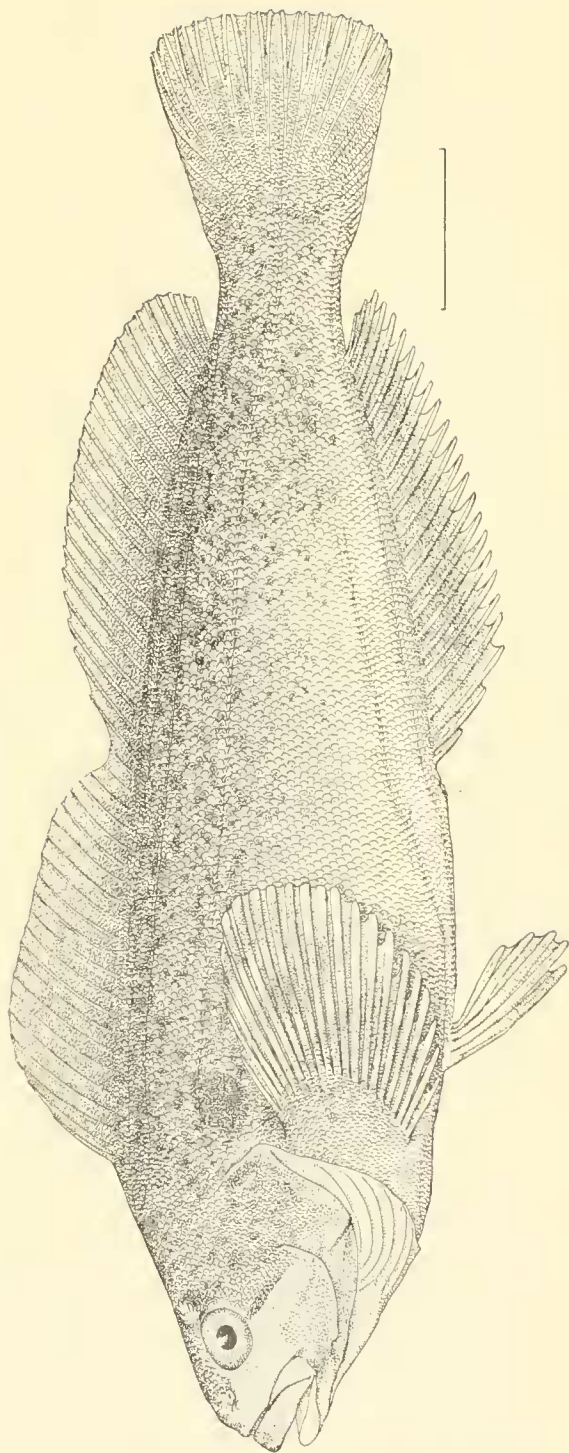
In all of these places the cutthroat trout was fairly common, apparently most abundant at Loring, Lake McDonald, and Klawak. It doubtless occurs in many other streams and lakes in Southeast Alaska. Just how far north it extends has not been definitely determined. We did not find it north of Sitka. We have a photograph, taken by Mr. R. W. Stone, of the U. S. Geological Survey, and furnished by Mr. Frank Hess, also of the Survey, showing a number of trout and salmon caught September 25, 1904, at Katatla, Controller Bay, in a stream about one-fourth of a mile from the beach. Among the fish shown is one that is evidently a cutthroat or a rainbow trout.

The following notes were taken on specimens from various places:

No. 02809, taken with fly by Dr. Evermann in Lake San Mateo, Vancouver Island, a female 14.5 inches long, weight one pound, not nearly ready to spawn. Color in life, top of head, back and side to base of pectoral thickly covered with small, somewhat stellate black spots, those on head and nape roundish; cheek with about 7 black spots—2 or 3 on upper part of opercle; dorsal and caudal with numerous oblong black spots; 3 spots on adipose dorsal; anal with black spots less numerous than on caudal and dorsal; ventrals pale rosy, the outer ray with a series of small black spots; pectorals pale rosy on inner rays, the outer dusky; cheek and opercle with rosy; some rosy on side of lower jaw; belly dusky, slightly rosy; throat with a broad, rich red dash on each side; tip of lower jaw black; side silvery with bronze wash; the black spots on back and side about evenly distributed, those on caudal peduncle largest. When first taken out of the water the whole fish except belly appeared quite dark.



1. SALMO CLARKII (RICHARDSON).



2. HEXAGRAMMOS LAGOCEPHALUS (PALLAS).

Another specimen (no. 02810) from the same place, an immature male 9.5 inches long, was similar in life color to the one above described, except that there were no spots on ventrals, and cheeks and opercles were more spotted, there being 3 or 4 spots on preopercle and the same number on opercle.

An example (no. 02811), 11 inches long, from Courtney Lake, was a male somewhat more mature than no. 02810, and its color was similar, except that the spots on side of head were less numerous, being but 4 on upper part of cheek, 2 on preopercle and 4 on upper part of opercle. On no. 02810 the spots extended farther down; scales about 165.

Another example (no. 02812), 6 inches long, from same place, is profusely spotted like the others and shows traces of parr marks. The red on throat present, but not distinct.

A fine 13-inch example, taken July 11 by Lieutenant Mitchell in Karta Bay Stream a short distance above the mouth, when fresh was dark olive on back, side silvery, belly white; back and upper four-fifths of side profusely covered with small irregular black spots; side of head with a few small round black spots; cheek and middle of side with pale rosy wash; throat with light red wash; fins all dark; dorsal and caudal with many large black spots; anal a little paler and with fewer spots; ventrals still paler, black inside; pectoral dark, with 2 or 3 small black spots. Dorsal 10; anal 12.

A 9.5-inch specimen (no. 02944), weighing 4 ounces, caught by Dr. Evermann at Pablof Falls, July 25, was in life yellowish green on back and upper part of side; middle of side slightly rosy, belly silvery; back with close-set small roundish black spots; side with larger black spots; top of head and cheek with small round black spots; opercle somewhat rosy; throat rich red.

Another was silvery, dark, profusely spotted with black, and with the red on throat very distinct.

No. 03021, taken at Klawak, August 26, had the body and head profusely and uniformly covered with large, irregular black spots; fins all densely spotted.

Two 7.5-inch specimens (2 and 2.5 ounces each), taken by Lieutenant Mitchell and Chief Engineer Crater at Silver Bay near Sitka, had the spots confined chiefly to back and side above lateral line and head; caudal peduncle with more spots; very little red showing on throat of second, none on first; side somewhat rosy, cheek also. It may be that these are young steelheads.

We have critically examined more than 30 excellent examples of cutthroat trout from the vicinity of Yes Bay and Loring, and many other specimens from those places, Klawak, and elsewhere, in Southeast Alaska, have passed through our hands. An example 14.5 inches long from Lake McDonald may be regarded as typical: Head 4.4; depth 4.4; eye in head 6.5; snout 3.5; maxillary 1.9, reaching slightly past orbit; pectoral 1.8; least depth of caudal peduncle 2.4; scales about 146. Body robust, not greatly compressed, the caudal peduncle stout; head rather long and conic; snout rather long and pointed. Entire body covered somewhat profusely with small stellate black spots, less numerous on head, where they are more nearly round. Dorsal, anal, and caudal fins profusely spotted; pectoral with a few spots, ventrals plain; ventrals and anal slightly tipped with yellow; a bright red dash on the throat.

The Alaska cutthroat is close to the Alaska rainbow and may not be always readily distinguished from it. We believe them to be distinct species, however. The cutthroat may be distinguished by its red throat, more stellate black spots, longer head, longer maxillary, less brightly tipped ventral and anal fins, and smaller scales. The number of scales in the lateral line runs from 140 to 180, while in the rainbow it runs from 120 to 140. The cutthroat is not as large as the rainbow, the largest example seen by us being only 14.5 inches long. The numerous examples examined range in length from 6 to 14.5 inches. At Klawak local anglers stated that the cutthroat does not attain as large size as the rainbow of the same stream, and this statement was borne out by our own observations at that place; also at Loring and Lake McDonald.

The Alaska cutthroat trout ranks high as a game fish, though not equaling the rainbow. It is a much better game fish than the Dolly Varden or salmon trout. It strikes with more vim, fights more viciously, dives more deeply, ranges more widely, and is much more apt to jump; but when once out of the water it is more quiet than the Dolly Varden. It takes the fly readily, but of course the baited hook is more attractive.

Mr. A. B. Alexander and the senior writer of this report visited San Mateo Lake June 22 expressly to obtain examples of this trout. At first we rowed about over the lake some time, trying different apparently likely places with different kinds of flies and, finally, other lures. One slight strike was gotten in the upper end of the lake, but no others until we reached a small cove on the south side, where

Mr. Alexander got a fine 9.5-inch example at the surface. A little later another fine example was hooked at a depth of about 6 feet. It fought very vigorously, usually bearing down very hard, then circling about rapidly, leaping slightly, then bearing down again and circling again, and coming alongside, and finally breaking away—the penalty we paid for being without a landing net. This fish was estimated to be 19 inches long. A few minutes later another was hooked in 4 feet of water, and, though given no opportunity to play, showed itself able to make a good fight. Later each of us got one good strike, but failed to land the fish. Local anglers call these “black-speckled trout.”

The examples taken at Pablof Falls had little opportunity to show their fighting power on account of the very turbulent water and the vast number of salmon and Dolly Varden trout which crowded upon them.

Mr. Crater reported that the three which he took in Naha Stream were very satisfactory as game fish.

As a food-fish the Alaska cutthroat is delicious—far superior to the Dolly Varden and not inferior to the Alaska rainbow. The flesh is firm, flaky, and rich in oil, with a most agreeable flavor.

This trout inhabits both streams and lakes. At Loring it occurs in both. At Yes Bay the finest examples were obtained from the stream between Lake McDonald and the bay. Those from Klawak came from the stream below the lake.

In Alaska this species is usually known as the black-speckled trout, blackspotted trout, or cutthroat.

33. *Salmo gairdneri* (Richardson). *Steelhead Trout*. (Pl. XXXVIII.)

The first records of steelhead trout in Alaska are those by Dr. Bean from Sitka and from St. Paul, Kodiak Island (1881), and Mountain Lake near Mount Tongass (1883).

The species seems to be widely distributed in Alaska, although definite records are not numerous. Captain Moser states that it occurs at all seasons at Afognak Island, but in greatest numbers during the coho run. It is believed to winter in the lakes and to descend to the sea soon after the

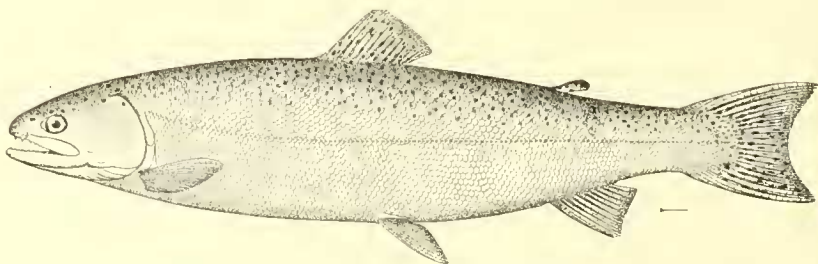


FIG. 10.—*Salmo gairdneri* (Richardson).

streams open in the spring. He further says that steelheads were first noticed in the vicinity of Pyramid Harbor in 1900 and that they have not been noted at Chekats. Several specimens were secured at Chilkoot Inlet, August 20 to September 8, and an occasional example is seen at Point Highfield.

On March 26, 1903, two steelheads—the first of the spring run—were caught in a gill net at the Fortmann Hatchery. On April 26 two others with shrunken stomachs and well-developed eggs and milt were taken at the same place. On May 8 steelheads were spawning in Naha Stream below Dorr Falls. On May 10 about one dozen were observed to be spawning in Steelhead Creek near Loring. The temperature of the stream was between 38° and 39°; the surface temperature of Naha Bay was 40° to 43°. About all these fish had disappeared by May 17. On May 23 about 30 steelheads (mostly spent females) were taken in a seine in Naha Stream above Dorr Falls. At one haul of the seine in a hole below the falls about the same number were taken, among them several ripe males and females. On July 8 several fish believed to be steelheads were seen in the river above the lake. July 26 many steelhead fry were seen dying on the sandbars in Karta River, where they were entrapped by the receding waters. The same occurrence was observed in Flume Creek near Loring, where, on August 12, 1904, Mr. H. C. Fassett picked up 73 steelhead fry from the margin of the pool under the dam built below the falls to supply water to the flume. Others were observed at various places in the dry bed of the stream where they had been left by receding waters. The next day 87 steelhead fry were collected under similar conditions. These fry measured 29 to 36 mm.

Two adult steelheads were taken in Hot Springs Creek, Bell Island. These with several others were in a deep pool where they had been left by falling water as they were returning from their spawning beds in the lake about a mile farther up the stream. Examples are also reported from the Pacific Cold Storage Company at Taku Harbor. On August 14 a few were seined at Karluk, where they are reported not to be common. May 26 to 30 Mr. Claudius Wallich found them spawning in the stream at the head of Lake McDonald. Quite a number were observed. On May 24 to 27, 1904, Mr. F. M. Chamberlain found them spawning in Steelhead Creek near Loring, also in Naha River above Dorr Falls. The temperature of the water in the creek was 56° to 57°, that of the river being 50°. No steelheads were noticed in a small branch of Steelhead Creek, where the temperature was 45°.

One example (no. 02813; scales about 150), 10 inches long, was caught with hook and line June 22 in Courtney Lake at Union Bay. A few examples were seen in the cannery at Point Highfield July 13 and at Taku Harbor July 14. A female 17 inches long and weighing 1 pound 10 ounces was caught at Snug Harbor August 6.

The center of abundance of the steelhead is evidently the Columbia River. Mr. F. M. Warren, sr., of Portland, reports that the run in the Columbia, Rogue, and other Oregon rivers was large in 1902 and 1903. The first spring run in 1903 was about June 20 and continued two days, the fish averaging only 7 pounds. The fish of the later run (in August) were much larger, averaging about 15 pounds. A few may be taken in the Columbia any day in the year. The largest one of which we have a definite record was caught at Corbett, on the Columbia River, by Reed Brothers. It was seen by Mr. J. N. Wisner and weighed 42 pounds. Reed Brothers state that they often get steelheads of that size.

On September 11 many steelheads were seen in Mr. Warren's cold-storage plant at Goble, on the Columbia. They were then being caught in traps near by. At this time it was difficult to tell males from females. A female examined showed the roe to be very immature, indicating that spawning would probably not have occurred before February or March.

One hundred and five examples were measured and weighed. The lengths varied from 31 to 45 inches and the weights from 10.5 to 32.5 pounds. The average length was 37.03 inches and the average weight 18.48 pounds. Several examined at Pyramid Harbor in August were 26 to 32 inches long and weighed 9.5 to 13.5 pounds. One taken at Bell Island was 33 inches long and weighed 9 pounds.

In September and October, 1897, Mr. A. B. Alexander, of this Bureau, examined a large number of steelheads at the Cascades and at Celilo, on the Columbia River. Many were seen, September 18 and 19, ascending the falls. In all 4,179 were examined; of these, 1,531 were males and 2,648 females; 476 males and 900 females were regarded as well developed and ready to spawn within a month or six weeks.

This ripening of the steelhead in the fall is probably unusual. All other observations indicate that this species is a spring spawner. In the headwaters of Salmon River, in Idaho, it spawns in early spring—usually in May and June. In Alaska, so far as known, it spawns early in the spring.

It is not always easy to distinguish the steelhead from the cutthroat or the rainbow trout; it is particularly difficult, if not impossible, to do so in the fry and fingerling stages. The adult Alaska steelhead has larger scales, a shorter head, and a smaller eye than the Alaska cutthroat; it is also less profusely covered with black spots, the tail is more nearly square, and there is no red on the throat. From the Alaska rainbow trout it may usually be distinguished by the smaller eye, somewhat smaller scales, less brilliant coloration, and relative absence of black spots except on upper part of side and on dorsal and caudal fins.

The steelhead reaches a much larger size than either the cutthroat or the rainbow. On the Columbia it is of much commercial importance. In Alaska it is a valuable food fish, though it is not abundant enough to be of as great importance as any of the species of salmon. It lends itself well to the canning process and is a nutritious and very palatable article thus prepared. It is, however, most valuable as a fresh fish, especially when distant shipments are necessary. There is no member of the salmon family which can be handled more satisfactorily in cold storage than the steelhead. Its size, trim shape, firm flesh, and superior keeping qualities fit it admirably for treatment in this way.

34. *Salmo irideus* (Gilbons). *Alaska Rainbow Trout*. (Pl. XXXIX.)

The rainbow trout has not previously been reported from Alaska, except by Bean in 1881 from Sitka, although its presence in Southeast Alaska was known to various officers of the *Albatross* and local anglers. No specimens, however, had been collected or had come into the hands of any naturalist.

It was therefore a great pleasure to us to find rainbow trout in at least two of the streams visited in 1903—the Naha Stream at Loring and Klawak River at Klawak. On August 30 Chief Engineer Crater and Paymaster McMillan caught 13 fine examples in Naha Stream, the largest about 16 inches long and weighing about 2 pounds. On August 26 Dr. Evermann took 2 good ones in Klawak Stream above the lagoon. Mr. Thompson, the storekeeper at Klawak, reported that he had recently taken in this stream a rainbow trout that was 32 inches long. Mr. H. F. Swift says that he caught one in 1878 which weighed 8 pounds. He says that he has seen several, each weighing as much as 5 pounds.

On August 3, 1901, Dr. C. St. J. Butler and Lieut. Hugh Rodman (both then of the *Albatross*) caught a number of rainbow trout in a stream flowing into Hanas Bay, Chicbagof Island, Chatham Strait, near Killisnoo. Mr. J. A. Kerr, of Seattle, informs us that rainbow trout are abundant in Powell River at the upper end of Tuxada Island, where they can be taken from June until late in the fall. About the end of August 110 were caught. He says the species occurs also at Thorne Bay. Mr. Chamberlain reports them to be common in Naha Stream near Loring, where he has seen examples 2 feet long.

During the investigations at Yes Bay in 1905 Mr. Chamberlain and Mr. Burcham found the rainbow trout quite abundant, particularly in the outlet of Lake McDonald. On June 9, 1906, Mr. Sidney Paige, of the U. S. Geological Survey, forwarded to the Bureau from Knik, Alaska, three small examples of rainbow trout which had been taken in Cottonwood Creek. This stream enters Knik Arm near its head,

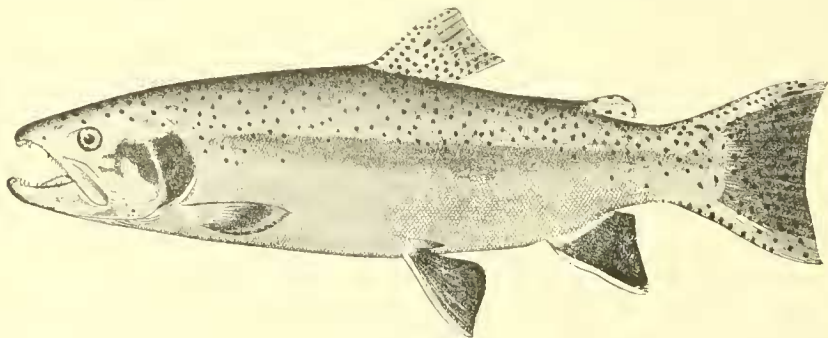


FIG. 11.—*Salmo irideus* (Gibbons).

which is at the head of Cook Inlet, in north latitude about $61^{\circ} 30'$. It is more than probable that the trout photographed at Katatla by Mr. Stone and already referred to in the discussion of the cutthroat trout was a rainbow.

The above-named localities are, therefore, the only Alaskan localities in which the rainbow trout is definitely known to occur. There are no records for the Kodiak region, the Aleutian Islands, or any waters in or north of the Alaskan Peninsula. It is quite certain, however, that further investigation will demonstrate its presence in many Alaskan streams in which it is not now known to occur.

Whether the rainbow trout of Alaska is distinct from typical *Salmo irideus* (of San Leandro Creek, California) we are not prepared to say, and we provisionally identify our specimens with that species, reserving a final decision until we have more material for comparison.

A typical example of the Alaska rainbow is no. A272 (4569), 23 inches long, from Lake McDonald, September 7, 1905. It may be described as follows:

Head 3.8 in length; depth 4.4; eye 6 in head; snout 2.9; maxillary 1.5, long and narrow, extending far beyond orbit; pectoral 1.6; body considerably compressed; head long, conic; snout long and pointed; least depth of caudal peduncle equaling length of snout; tail square, but slightly forked.

Color in alcohol: Entire body closely covered with very distinct small black spots, quite as numerous below lateral line as above; head with relatively few roundish black spots, about 20 or 25 on cheek and opercle; fins all black spotted, the spots less numerous on pectorals and ventrals; ventrals, anal, and dorsal tipped with yellowish; middle of side and cheek with a broad rosy band; no red on throat; scales 134.

An example 10 inches long from Cottonwood Creek, Knik Arm, is described as follows:

Head 4.5 in length; depth 4.3; eye 4.75 in head; snout 4.75; maxillary 1.9; scales about 120.

Body compressed; caudal peduncle deep; head rather short; maxillary extending scarcely beyond eye; teeth fairly strong on maxillary, premaxillaries, palatines, vomer, mandible, and tongue, those on vomer in two rows.

Body rather profusely covered with small black spots most numerous above lateral line; top and upper part of side of head with few small round black spots; dorsal and caudal with black spots; anal dusky, unspotted; pectorals and ventrals immaculate; side with a red stripe in life.

Two other somewhat smaller specimens possess the same characters.

An example (no. 3020) from Klawak in life had on the side a broad rich rosy band extending across the cheek and along the lateral line to base of caudal fin; no red on throat; back and side profusely spotted with small round black spots, quite uniformly distributed; caudal fin and peduncle thickly spotted.

We have examined 34 other specimens of rainbow trout from Southeast Alaska and find them to agree essentially with the specimens above described. Most of them are from Lake McDonald and vicinity, where they were collected in 1905 by Mr. Burcham. Numerous other examples were examined in 1903 at Klawak and Loring. Occasionally an individual in prime condition shows more or less red or orange on the throat, but ordinarily this mark is indistinct or wholly absent. The bright tip of the anal, ventral, and dorsal fins, however, is usually present, and this, together with the large scales, absence of red on the throat, and rosy side, will usually suffice to distinguish the Alaska rainbow from the Alaska cutthroat, though the two species are exceedingly close to each other. The rainbow attains the larger size. The largest examples seen by us were about 2 feet long. One taken at Klawak was 32 inches long, and, as already stated, Mr. H. F. Swift says he has seen several weighed 5 pounds and one that weighed 8 pounds.

The Alaska rainbow trout stands easily among the finest of game fishes. It is certainly one of the best, if not the best, in Alaska. Expert anglers fishing in Naha Stream, at Yes Bay and Klawak, pronounce it the gamest trout they have ever caught. It takes the fly readily, not with a dash or rush, but rather quietly. When once hooked, however, it fights most savagely, jumping often, and is very hard to wear out.

35. *Cristivomer namaycush* (Walbaum). *Great Lakes Trout; Lake Trout.*

The lake trout is doubtless found in all suitable waters in the Yukon basin. An individual weighing 7.25 pounds was taken in Lake Bennett, one of 11 pounds at Log Cabin, and we have seen specimens from Tagish Arm and Lake Atlin. An example was caught by Dr. Harold Heath in Summit Lake at White Pass, July 20, and one of good size was taken in Tagish Arm near Caribou Crossing July 19, by trolling, which is the usual method of capture. Townsend (1887) records this species from a lake at the head of

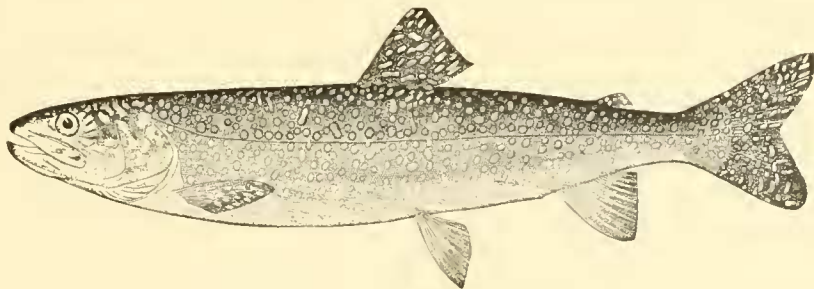


FIG. 12.—*Cristivomer namaycush* (Walbaum).

Kobuk River, and states that it reaches a length of 3.5 feet or more. He did not find it in the Kobuk River. The fish apparently attains as large size in Alaska as in the Great Lakes, for examples weighing 30 to 40 pounds have been reported. It is of considerable commercial importance in this region, large numbers being shipped, particularly from Lake Atlin, to Dawson.

The lake trout can be readily distinguished from all other Alaskan Salmonidæ by the presence of a raised crest behind the head of the vomer and free from its shaft, and by the color, which is dark gray, sometimes pale, sometimes almost black, everywhere with rounded paler spots which are often reddish tinged; head usually vermiculated above; dorsal and caudal reticulate with darker.

36. *Salvelinus malma* (Walbaum). *Dolly Varden Trout; Salmon Trout; Western Charr.* (Pl. XL.)

This is the most abundant trout in Alaska. It swarms in every stream and lake about the islands from the Columbia to Bering Sea, and was seen by us at practically all places visited. It is particularly abundant about the canneries, where it feeds ravenously on the salmon eggs and other refuse from canning operations.

Our field notes make specific mention of the Dolly Varden trout as seen at the following places: Fort Rupert (abundant), stream at head of lake at Boca de Quadra (very abundant), Metlakahtla (seined), Karta Bay (in Alaska Packers Association trap), Cleveland Passage (seined many, 5 to 14 inches long), Taku Inlet cannery (several seen), Chilkoot cannery (very abundant), Taku, Dewey Lake near Skagway (common, but very small), Punter Bay (seined 4), Killisnoo, Sitkoh Bay, Dundas Bay (many seined and many seen in salmon trap), Pablof Falls (many seined and many caught on hook and line), Indian River at Sitka (several fine ones taken on hook and line, July 28), creek at Silver Bay near Sitka (many taken on hook July 29), Aiognak Falls (abundant August 3), Karluk, Uyak, and Alitak.

On September 9, 1904, Mr. Hess, of the Geological Survey, found Dolly Varden trout 8 to 10 inches long in Big Minook Creek 10 miles from Rampart. They were abundant and were spawning. Every one examined contained parasites in the air bladder. On September 5, 1903, Mr. Hess obtained this trout in Niukluk River near Council. In October, 1905, the Bureau received 5 examples, 5.87 to 8.87 inches long, from Mr. S. P. Robins, of Rampart, who had caught them in Mynook Creek, a tributary of the Yukon.

At Aiognak Falls on August 3, various parties from the *Albatross* caught many Dolly Varden trout and salmon by using a gang of 3 hooks tied together. The fish were so thick that they were readily hooked as the gang was dragged through the water.

Near Skagway is a small lake called Dewey Lake, which is some distance above sea level. It is said to be impossible now for fish to reach it from the sea, yet Dolly Varden trout occur in this lake in some numbers. They are very small, only a few inches long, and more brightly colored than those from salt water. In a small stream near Unalaska these trout are found above what is now an impassable falls. They never exceed a few inches in length, and are very richly colored. They were described as new in 1873 by Cope who called them *Salmo tudes*.

Previous Alaskan records for this trout are—Cope (1873), Captains Harbor, Unalaska. Bean (1882): Sitka; Old Sitka; Port Althrop; Chugachik Bay, and Refuge Cove, Cook Inlet; St. Paul, Kodiak Island; Humboldt Harbor and Little Koniushu Island, Shumagins; Hinikuk and Nateekin Bay, Unalaska; Kyska Harbor; St. Michael; Unalaklik; Hotham inlet; Port Clarence; Cape Lisburne; Arctic Ocean. Gilbert (1895), Unalaska Island. Gilbert says "a small stream entering Captains Harbor, Unalaska Island, has a series of impassable cascades aggregating several hundred feet in height. Above these falls the trout are very abundant, but are dwarfed in size and remarkably brilliant in coloration. They seem to reach no larger size than 8 inches". Cantwell (1885) Kobuk River. Murdoch (1885), near mouth of Colville River and at Pergniak. Nelson (1887), Golsova River. Scofield (1899), Port Clarence, Point Hope, and Herschel Island.

The Dolly Varden trout attains a weight probably of 25 pounds, though the largest seen by us in Alaska weighed less than 4 pounds. The maximum length of those we saw was 21.5 inches.

The average weight of 64 fish weighed at Pablof Falls was 1.5 ounces; length, 7 inches.

Twenty-four were examined at Snug Harbor, 16 males and 8 females. The males averaged 14.84 inches long and 11.28 ounces in weight; females, 17 inches long and 9.44 ounces in weight.

Four males and 12 females were examined at Karta Bay. The males averaged 14.375 inches long and 1.125 pounds in weight; females 15.77 inches long and 1.54 pounds in weight.

At Chignik Bay 15 males averaged 16.2 inches long and 1 pound 12 ounces in weight; 2 females, 17.75 inches long and 2.5 pounds in weight.

The 16 examined at Karta Bay were all that were found in a trap with about 300 to 400 sockeyes, 2 cohoes, and 3 starry flounders.

In the quiet portion of the Home Stream at Point Ellis (really a part of the upper end of a small lake), Dolly Varden trout were very abundant August 22. In one pool, 2 to 6 feet deep and 25 feet wide, we saw 500 to 600. They ranged in length from a few inches to 2 feet. They were certainly spawning, and they were not paired off but were all in a bunch. As one would swim over some clean gravel it would turn on its side and rub against the bottom, evidently to press out the eggs or milt.

In Heckman Lake, August 30, many were seen jumping.

In the Bristol Bay region this species appears to reach a larger size than elsewhere in Alaska. On July 4, 1906, Mr. John N. Cobb measured and weighed 27 examples (14 males and 13 females) from the Nushagak River. The largest male was 29.25 inches long and weighed 8.5 pounds; another that was 29.75 inches long weighed only 7.5 pounds. The largest female was 26.75 inches long and weighed 7 pounds, while another 27.25 inches long weighed but 6 pounds. The average of the 14 males was: Length 27 inches, weight 6.93 pounds; females, length 25.6 inches, weight 6.2 pounds. On July 19 Mr. Cobb examined 5 males and 1 female from the same river. These ran from 18 to 19 inches in length and 1.25 to 2 pounds in weight.

The salmon trout, to call it by another of its names, is the most persistent and destructive enemy of the salmon eggs and fry. When the sockeye, humpback, and coho are running upstream they are accompanied by vast numbers of salmon trout, which apparently have no other purpose than feeding upon their eggs. And the trout are quite as persistent in ascending rapids and jumping falls as are the salmon themselves. Not only during the spawning time do the trout remain, but so long as the eggs are to be found; and after the eggs have hatched the fry and fingerlings fall a ready prey to this voracious trout, which pursues them not only in the streams and lakes but down to salt water, where the destruction continues until the salmon have grown too large to be eaten.

On August 3, among the salmon at Afognak Falls, were hundreds—perhaps thousands—of the trout, all trying just as hard and just as successfully to ascend the falls. They jumped surprisingly well, sometimes it seemed even better than the salmon; even little ones not over 6 inches long would jump beautifully, and could maintain themselves in the vertical current quite well. Every possible resting pool, however small, had trout in it, and in the larger ones trout and salmon were mixed. There were some very large trout, and in a pool above the falls several of good size were seen.

Similar conditions were observed at Pablof Harbor, a small arm of Freshwater Bay, Chichagof Island, July 25. Into the head of this small bay empties Pablof stream, a small creek perhaps 50 feet wide. Near its mouth is a falls where the water drops by broken stages some 20 or 25 feet at low tide, but less at high tide. Below this falls were hundreds of humpbacks with a good many sockeyes and a few cohoes and dogs, all trying to get over the falls. With them were hundreds—perhaps thousands—of Dolly Varden trout and a good many cutthroat trout, all trying equally hard to ascend the falls. They could be seen in great numbers lying in the pools below or swimming about, or making heroic efforts to scale the falls. Every pool or possible resting place in the falls was literally packed with trout, 2 or 3 layers deep where the water permitted, all with their heads upstream. Among them in the larger pools was an occasional salmon.

The trout could be seen jumping quite as often as the salmon and apparently with even greater success in ascending the falls. They have an advantage in their smaller size, being able to find resting places in the small nooks and eddies. They are able, however, to jump very well, and to maintain themselves against or even to ascend a practically vertical current.

Ordinarily the Dolly Varden trout does not take high rank as a game fish; it is usually loggy, never jumps, and makes a poor fight. But this is not always the case; much depends upon the water, the particular fish, and perhaps other factors.

One of us has found that these trout are very good fighters in the swiftly flowing waters of Idaho, particularly in the Salmon River and elsewhere in the Sawtooth Mountains. In Alaska they are very good game fish, and there is scarcely a stream or lake in that country where the angler may not find excellent sport with them. We have angled for them in many Alaskan waters, among which may be mentioned the Naha Stream and lakes near Loring, small streams near Unalaska, Indian River, and creek at Silver Bay near Sitka, Afognak Falls, and Pablof Falls. At the last-named place we found them unexpectedly gamey. A 12 to 15 inch fish in this turbulent water was able to make a fight that would delight the heart of any angler. Moreover, these trout rise to the fly readily, take it with a rush, and do not give up the fight until safe in the creel. Even when lifted from the water or placed in the landing net they continue to flop with great vigor, so that it is not an easy matter to remove the hook. They do not often jump from the water when hooked, though they occasionally do.

The best flies were small ones of red color; those most resembling salmon spawn were the most killing. A fly of this kind used at Pablof Falls would scarcely touch the water before dozens of trout would vie with each other in frantic efforts to seize it. Occasionally a fish would discover the nature of the fly and turn away, but usually one of them would take it. Salmon spawn, however, is the bait that never fails.

Our experiences at Pablos Falls showed that "tickling trout" is as possible in Alaska as in England. While fishing from a ledge out near the middle of the falls we noticed some trout resting in a relatively quiet pool part way up the falls. By reaching one's hand into the water and carefully touching a fish near the tail, then moving the hand forward, gently rubbing the belly and side, and then closing down upon the fish when the hand reached the head, it was possible to lift the fish out of the water without disturbing any of the others. In this way we secured quite a number for our creel. At first they were quite heedless of the hand, but when one became alarmed and, being very slick, got away, all the others in the pool were apt to become greatly disturbed and scurry away pellmell, going down to the foot of the falls.

The ovaries of all of these trout were quite small and immature, and this was evidently not their spawning season. It is doubted whether their efforts to ascend these falls were actuated by a desire to reach their own spawning beds. The only rational explanation of their running upstream at this time is that it was for the purpose of reaching the spawning beds of the salmon that they might feed upon the salmon eggs.

Family 14. THYMALLUDÆ. The Graylings.

37. *Thymallus signifer* (Richardson). *Alaska Grayling*; "Tahsch" (Indian name). (Pl. XL.)

Very abundant in the headwaters of the Yukon. July 18 to 20 numerous specimens were collected in Tagish Arm near Caribou Crossing and from Kilbourne Creek, a small stream flowing into Tagish Arm. Others were seined in the outlet of Lake Bennett, north of the station at Caribou Crossing. At Lake Bennett, July 20 and 21, several small examples were seined near the head of the lake and several larger ones were taken with the fly. One particularly fine example (no. 2928), 15 inches long and weighing 1 pound and 2 ounces, was taken on the hook near the railroad station at Lake Bennett. A special agent of the Yukon and White Pass Railroad caught several in a small lake near Log Cabin, which is between Lake Bennett and Caribou Crossing. The fish is said to occur also in Lake Atlin and in Forty-mile Creek, in which it is reported to reach a very large size.

The grayling is probably of wide distribution in northern Alaska, particularly throughout the Yukon basin. Mr. Frank Hess, of the Geological Survey, reports it from Sinuk River, about 35 miles northwest of Nome, and he was informed that it occurs in the same river 70 miles northwest of Nome. He found it also in Kuzitriñ River 35 miles northeast of Council, in Niukluk River at Council, in El Dorado Creek (a tributary of Noxapaga River) 125 to 150 miles northeast of Nome, and in the Kugruk River 110 to 120 miles north of Nome. On August 9 he saw them spawning in streams 40 miles north of Fairbanks. It was found also in Kugruk River (a different stream flowing into Kotzebue Sound) by Mr. Fred H. Moffit, of the Geological Survey. Mr. Frank C. Schrader found it in 1902 in Colville River and in other streams and lakes of that region. Mr. Walter C. Mendenhall, also of the Geological Survey, says that grayling may be found in all of the clear-water streams of the Kobuk Valley.

Mr. E. W. Nelson, of the Biological Survey, reports the grayling from a small stream flowing into the Arctic Ocean just north of Cape Lisburne, about halfway between Kotzebue Sound and Point Barrow. This stream is only 12 to 15 miles long and the grayling were seen in a small pool about half-way up the stream. They were only a few in number and were adults 12 to 15 inches long. According to Mr. Nelson, grayling occur in all the streams entering Norton Sound; also in the upper tributaries of the Yukon some 30 to 35 miles northeast from St. Michael. They do not occur in the streams down in the flats, but up in the hills they are in every clear stream. Dolly Varden trout are most abundant in the larger streams, grayling in the smaller ones.

The examples taken with the fly at Caribou Crossing and Lake Bennett varied in length from 4.5 to 15 inches. The respective lengths in inches of 27 specimens measured are as follows: $4\frac{1}{2}$, $4\frac{3}{4}$, $5\frac{3}{8}$, 6, $6\frac{1}{2}$, $6\frac{3}{4}$, 7, $7\frac{1}{2}$, $7\frac{3}{4}$, $7\frac{7}{8}$, $7\frac{5}{8}$, 8, 8, $8\frac{1}{2}$, $8\frac{1}{4}$, $8\frac{3}{4}$, $8\frac{7}{8}$, 9, $9\frac{1}{2}$, 10, 10, $10\frac{3}{4}$, 11, $11\frac{1}{2}$, $13\frac{3}{4}$, and 15 inches, the average being nearly 8.5 inches.

The example from which the painting was made was $12\frac{1}{2}$ inches long and was obtained at Caribou Crossing in August, 1903.

The 15-inch example (no. 2928) from Lake Bennett was described in life as follows:

Head 5.25 in body; depth 4.28; eye 4 in head; snout 4.6; maxillary 6; mandible 2; dorsal 21; anal 11, the last ray broad and firm; scales 10-93-10.

Body elongate, compressed, highest about the origin of the dorsal, from which the contour slopes gradually to the slender caudal peduncle; head small, somewhat pointed; mouth terminal, moderate,

the maxillary extending to below middle of eye; mandible extending to nearly posterior edge of orbit; teeth minute, numerous in both jaws and along maxillary, none on tongue; eye large, longer than snout, but not equal to interorbital space.

Scales on side about uniform in size; the caudal fin well scaled, two rows of small scales forming radiating feather-like projections on some of the interradiial spaces of the lobes of the fin; a naked patch back of isthmus; scales of jugular region minute, becoming larger backward and upward.

Dorsal fin long and high, the longest ray about 4 in body, its base 4.5; adipose fin small; longest ray of anal 2 in head, its base about the same length; gillrakers medium length, firm, rather stout, acute, 6+13 and 6+12.

Color in life, back light olive, edges of scales dark; side bluish silvery, centers of scales brightest; belly dull white, a dirty, rusty wash from base of ventral to lower part of pectoral; when scales rub off an orange color is shown; anterior part of side with 11 or 12 small blue-black spots; cheek somewhat rosy; membrane between rami of lower jaw black; dorsal olive, with 3 rows of rosy or purplish, lighter-edged, almost coalescing spots at base, above these about 6 less distinct rows of more isolated spots of same color; distal edge of fin purplish, posterior edge blackish above; ventrals olive, with 5 longitudinal purplish lines; pectoral, caudal, and anal olive, the caudal somewhat dark at base and edge.

A 10-inch specimen and 10 others taken at Caribou Crossing, July 18, had the following colors in life:

Back olive, the centers of scales lighter; side silvery, underlaid with olive; borders of scales dull golden; 10 inky black spots, irregularly arranged on anterior part of body, mostly below lateral line, these varying much, numbering from 3 to 17 in the 10 specimens at hand; one specimen has over 70 spots, rather paler, and arranged in irregular rows, extending back to adipose dorsal; head olive, with bluish luster, with some gold and brassy; a blue-black blotch under rami of lower jaw; branchiostegals brassy; dorsal dusky olive, upper edge blue-black, 4 rows of spots, the upper violet blue, others anteriorly violet, posteriorly reddish or yellowish green, a fifth partial row (6 on some), the smaller fish with spots less distinct; adipose dorsal dusky olive; caudal dusky with a submarginal paler streak; anal olive, dusky at tip; ventral dusky anteriorly, with 3 lengthwise strips of bright cream color; pectoral greenish; inside of opercle bluish.

Color in alcohol (No. 2928), back and upper parts of side pearly blue, somewhat paler below, nearly everywhere finely punctulate with minute black dots, but especially so in a streak on each side extending from the base of the pectoral to origin of ventral fin; a black or dark blue streak each side of chin, almost concealed by fold of jaw; a few (5-10) roundish blue spots along anterior part of side; dorsal fin highly colored, the ground-color dark blue, interrupted by elongate elliptical pink or red spots, these extending in rows between rays, their long axis parallel with those of the rays, the spots also in rows parallel with the back, almost forming continuous lines near the base of the fin; ventrals bluish dusky, with longitudinal bright dashes; other fins dusky.

• Most of the grayling from Caribou Crossing were taken with a fly from a small pier at the mounted police station a few rods below the railroad bridge, in water 2 to 5 feet deep. A very small fly (black gnat) was used. The fish took it either at the surface or when it was sunk a foot to 3 feet. The local anglers usually fish with the artificial fly and, of course, without any sinker, simply whipping the surface or allowing the fly to float down. Some, however, use a very light sinker and find that the grayling will sometimes take the fly even better when it is sunk 2 or 3 feet. Very small bits of fresh red meat are sometimes used and found attractive.

Considering the small size of these fish they were quite good fighters and afforded much sport. Those taken in the swift water of Kilbourne Creek seemed decidedly more gamy, partly, doubtless, on account of the current, but they were really better fighters.

The 15-inch example from Lake Bennett was caught while we were still-fishing from a pier near the hotel. This fish was seen in water 4 feet deep and was repeatedly tried with various kinds of flies, but it paid no attention to any of them. As a last resort a small piece of fresh, red meat was placed on the fly, when the fish rose at once and took it greedily, proving very energetic and vigorous, and making a very pretty fight.

Family 15. ARGENTINIDÆ. The Smelts.

38. *Mallotus villosus* (Müller). *Capelin*.

Eight (4 male, 4 female) specimens 3.5 to 5 inches long, collected by the *Albatross* at Port Chester, September 26, 1900, and one 4 inches long from Loring, 1904.

Recorded also by Bean (1882) from Sitka; Chugachik Bay and Refuge Cove, Cook Inlet; off Marmot Island; St. Michael; Bering Strait; Cape Lishburne and Point Belcher, Arctic Ocean. Gilbert (1895), stations 3235, 3238, and 3240, Bristol Bay. Murdoch (1885), Point Barrow. Nelson (1887), Golovina Bay. Turner (1886), Atka Island. Seofield (1899), Port Clarence.

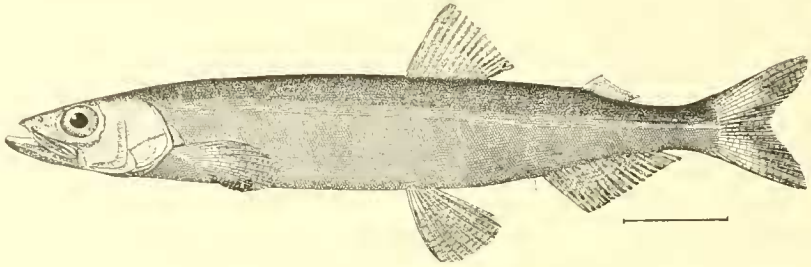


FIG. 13.—*Mallotus villosus* (Müller).

The capelin is an abundant fish in Alaska, often seen in large schools on the cod grounds. It is one of the principal foods of the cod, as many as 40 having been found in one cod's stomach. It is preyed upon largely also by the halibut and by whales. It reaches a length of 10 inches or less and is a very delicious food-fish which has not as yet been utilized in Alaska to any extent.

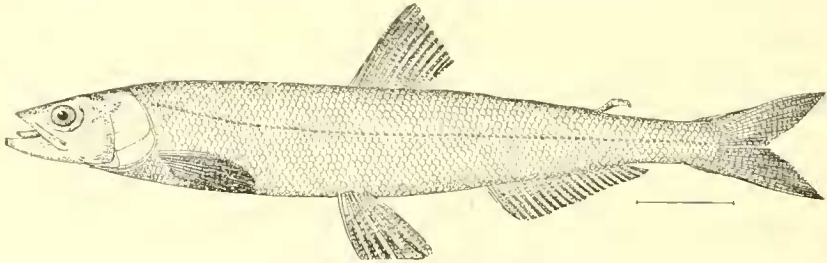


FIG. 14.—*Thaleichthys pacificus* (Richardson).

39. *Thaleichthys pacificus* (Richardson). *Eulachon*.

Recorded by Bean (1882) from Stikine River; Wrangell; Sitka; Chilkat River; and Katmai. Gilbert (1895), near the mouth of Nushagak River. Not taken by us.

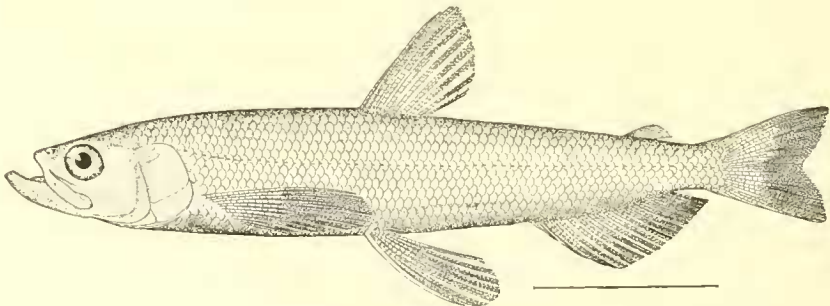


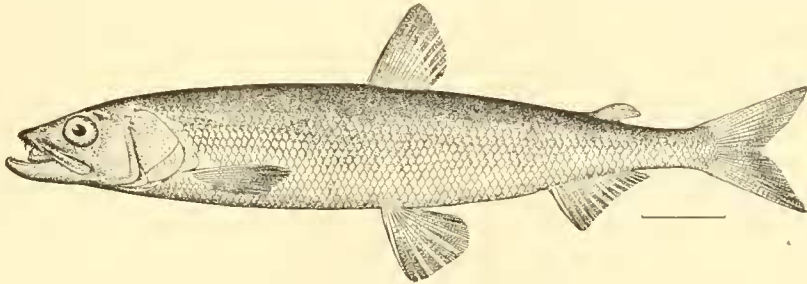
FIG. 15.—*Osmerus thaleichthys* (Ayres).

40. *Osmerus thaleichthys* (Ayres). *California Smelt*.

Recorded by Gilbert (1895) from Nushagak River, from which he again obtained 5 examples in 1903. They are 2.5, 2.75, 2.87, 3, 3.63 inches long, respectively. The largest and one other have the mouth strikingly different from the remaining specimens—maxillary teeth absent and the maxillary short and broad, while in the others it is long and narrow.

41. *Osmerus dentex* Steindachner. *Arctic Smelt*.

One specimen 4 inches long collected by the *Albatross* in Bristol Bay in 1890-91, and one 11 inches long at Tarcinski Harbor in 1900; one 5 inches long at station 3231, Bering Sea, June 2, 1890. Also recorded by Bean (1882) from Port Mulgrave, Yakutat Bay, and from St. Michael and Port Clarence.

FIG. 16.—*Osmerus dentex* Steindachner.

Gilbert (1895), Naknek and Nushagak rivers and station 3231 in Bristol Bay. Wainwright Inlet near Point Barrow (Murdoch 1886); St. Michael (Nelson 1887); Port Clarence (Scofield 1899). We have recently examined a specimen obtained in 1904 by Mr. Edward A. Preble in the Arctic Red River, a tributary to the Mackenzie.

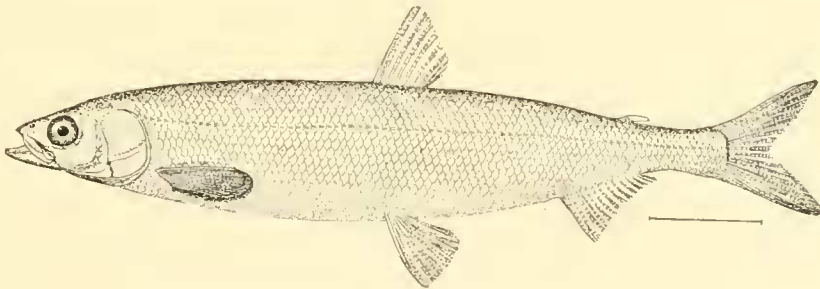
42. *Osmerus albatrossis* Jordan & Gilbert. (Pl. xiv, fig. 2.)

One specimen 5.25 inches long taken by the *Albatross* at station 3536, Bering Sea, and 2 specimens 3 and 3.5 inches long, from station 3789.

Originally described from Albatross station 3675 in Shelikof Straits (Jordan & Gilbert 1899).

43. *Hypomesus pretiosus* (Girard). *Surf Smelt*.

Nine specimens 2.75 to 6 inches long were seined in Kilisut Harbor; 16 specimens, 3.75 to 5.75 inches long, at Admiralty Head, Whidby Island; and one, 5.25 inches long, at Dundas Bay. The species has been recorded by Bean (1882) from Port Mulgrave, Yakutat Bay.

FIG. 17.—*Hypomesus pretiosus* (Girard).

In the specimens at hand the ventrals are inserted in front of the middle of the dorsal; in other respects the specimens agree well with current descriptions. A specimen 5.75 inches long is described as follows: Head 5; depth 5; eye equal to snout, 4 in head; dorsal 9; anal 14; pectorals 14; ventrals 8.

44. *Hypomesus olidus* (Pallas).

One specimen collected by the *Albatross* at Tareinski Harbor. Recorded from St. Michael (Turner 1886, Bean 1882), and from rivers back of Grantley Harbor (Scofield 1899). No Alaskan specimens seen by us.

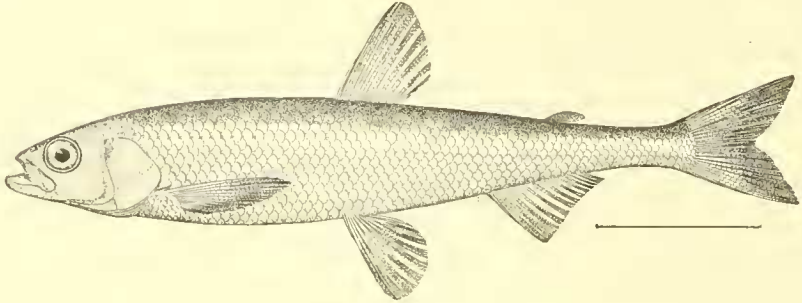


FIG. 18.—*Hypomesus olidus* (Pallas).

45. *Leuroglossus stilbius* Gilbert.

Recorded by Gilbert (1895) from station 3330, off northern shore of Unalaska.

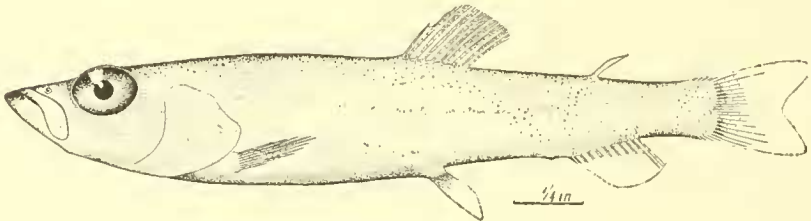


FIG. 19.—*Leuroglossus stilbius* Gilbert.

Family 16. MICROSTOMIDÆ.

46. *Bathylagus borealis* Gilbert.

Originally described from *Albatross* station 3327, north of Unalaska (Gilbert 1895).

Family 17. MYCTOPHIDÆ.

47. *Lampanyctus gemmifer* Goode & Bean.

Six specimens 3 to 4.25 inches long, dredged at station 4255, in Lynn Canal July 16, 1903.

48. *Nannobrachium leucopsarum* (Eigenmann & Eigenmann).

One specimen 3.5 inches long was picked up on the beach at Wrangell. Recorded by Gilbert (1895) from stations 3227, 3307, 3308, 3325, and 3329, all in Bering Sea, north of Unalaska Island.

49. *Nannobrachium nannochir* (Gilbert).

Two specimens 3.5 and 4.5 inches long, dredged at station 4267, off Mount Edgecumbe; 3 specimens 1.5 to 2 inches long, dredged at station 4257, in Lynn Canal, and 2 specimens 1 and 1.5 inches long, dredged at station 4235, in Behm Canal.

This species has been recorded by Gilbert (1895) from stations 3211, 3307, 3308, 3327, 3329, 3338, 3340, 3342, and 3348, including the entire North Pacific and Bering Sea.

50. *Diaphus theta* Eigenmann & Eigenmann.

One specimen 2.5 inches long dredged at station 4267, off Mount Edgecumbe in 922 fathoms. Head 3; depth 4.5; eye 3; snout about 3 in eye; dorsal 12; anal 9; pectorals 12; lateral line 35.

Family 18. CHAULIODONTIDÆ.

51. *Cyclothone microdon* (Günther).

Recorded by Gilbert (1895) from Albatross stations 3307 and 3308 in Bering Sea. Not taken by us.

52. *Chauliodus macouni* Bean.

One specimen 4.25 inches long from station 4231, Behm Canal near Loring, and another 3.5 inches long from station 4257, in Lynn Canal. Also recorded from station 3340, south of Alaska peninsula (Gilbert 1895).

Family 19. PLAGYODONTIDÆ.

53. *Plagyodus æsculapius* Bean.

Originally described by Bean (1884) from Iliuliuk, Unalaska. Recorded also from Summer Harbor, Unalaska (Jordan & Gilbert 1899).

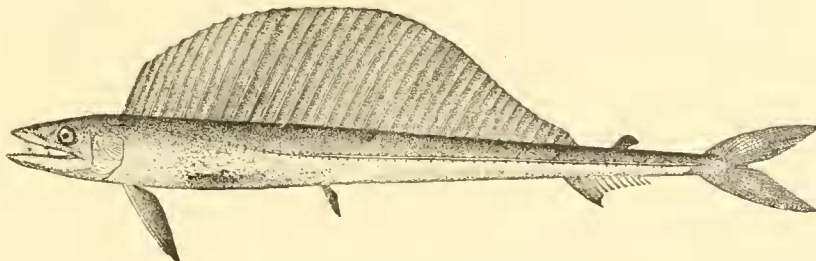


FIG. 20.—*Plagyodus æsculapius* Bean.

54. *Plagyodus borealis* (Gill).

Recorded from Captains Harbor, Unalaska (Bean 1882).

Family 20. NOTACANTHIDÆ.

55. *Macdonaldia challengeri* (Vaillant).

Recorded by Gilbert (1895) from Albatross station 3308 in Bering Sea.

Family 21. DALLIIDÆ.

56. *Dallia pectoralis* Bean.

This interesting fish, which is the sole representative of a family and order of fishes, was first described by Bean (1880), from specimens collected by its discoverer, Dr. Dall, at St. Michael. Specimens were also reported by Nelson (1887) from Andreafski, Yukon River, and mouth of Tanana River, and by Gilbert (1895) from Nushagak River. It occurs in great numbers on St. Lawrence Island. We have but a single specimen, one secured by Gilbert. Although so abundant in Alaska, this species is rare in museums and collections in general, illustrating the well-known fact that the commonest forms in nature are often the rarest as preserved specimens Turner (1886) says:

This species is probably the most abundant of all the fishes which occur in the fresh and brackish waters of the northern part of Alaska. It is found in all the small streams of the low grounds, in the

wet morasses and sphagnum-covered areas, which are soaked with water and which at times seem to contain water sufficient only to moisten the skin of the fish. In the low grounds or tundra are many, countless thousands, small ponds of very slight depth, connected with each other by small streams of variable width. * * * These narrow outlets of the ponds are at certain seasons so full of these fish that they completely block them up. The soft, yielding sphagnum moss above is pushed aside, and under it these fish find a convenient retreat. Here the fish are partially protected from the great cold of winter by the covering of moss and grass. In such situations they collect in such numbers that figures fail to express an adequate idea of their numbers. They are measured by the yard. Their mass is deep according to the nature of the retreat. * * * The natives repair to the places which are known to be the refuge of these fish and set a small trap. * * * The natives remove the trap every day or two to relieve the pressure on it and to supply their own wants and those of their dogs. * * * From May to December, tons and tons of these fish are daily removed. They form the principal food of the natives living between the Yukon Delta and the Kuskokwim River and as far interior as the bases of the higher hills. North of the Yukon Delta they are also abundant. The natives sell many of these fish in baskets, a few cents paying for about three-fourths of a bushel. When taken from the traps the fish are immediately put into these baskets and taken to the village, where the baskets of fish are placed on stages out of the way of dogs. The mass of fish in each basket is frozen in a few minutes, and when required to take them out they have to be chopped out with an ax or beaten with a club to divide them into pieces of sufficient size to feed to the dogs.

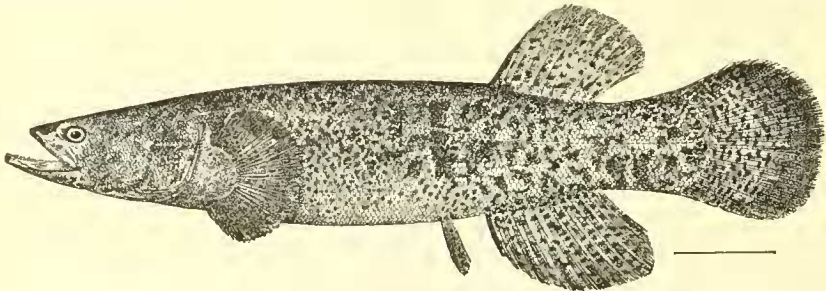


FIG. 21.—*Dallia pectoralis* Bean.

The vitality of these fish is astonishing. They will remain in those grass baskets for weeks, and when brought into the house and thawed out they will be as lively as ever. The pieces which are thrown to the ravenous dogs are eagerly swallowed, the animal heat of the dog's stomach thaws the fish out, whereupon its movements soon cause the dog to vomit it up alive. The food of these fish has always been a matter of wonder to me, considering the number of fish to be supplied in the scanty waters where they abound. The contents of several stomachs were examined and found to contain only a mass of undistinguished earthy matter, vegetable fragments, and what appeared to be the undigested portions of skins of small worms which frequent the ponds and low grounds. The spawning season is in June and July, or as soon as the lagoons thaw out sufficiently. The eggs are deposited in the vegetable slime at the bottoms of the small ponds.

According to Petroff, this little fish is found in all the shallower channels and lagoons throughout the delta between the mouths of the Kuskokwim and Yukon rivers in such quantities as to furnish subsistence for whole settlements in the most desolate regions where nothing else could be found to sustain life at certain seasons of the year. It is said that the people inhabiting these regions are in better condition physically when spring approaches than any of their neighbors in regions where it does not exist, they being almost exempt from the annual period of starvation elsewhere preceding the run of salmon in the rivers. The blackfish is exceedingly fat and a good quality of oil is obtained from it.

Family 22. ESOCIDÆ.

57. *Esox lucius* Linnæus.

Recorded from Yukon River (Bean 1882); common in Kobuk River (Townsend 1887); Andreafski, Yukon River (Nelson 1887). No specimens were obtained by us, but we were informed that it occurs in Lake Atlin and Tagish Arm.

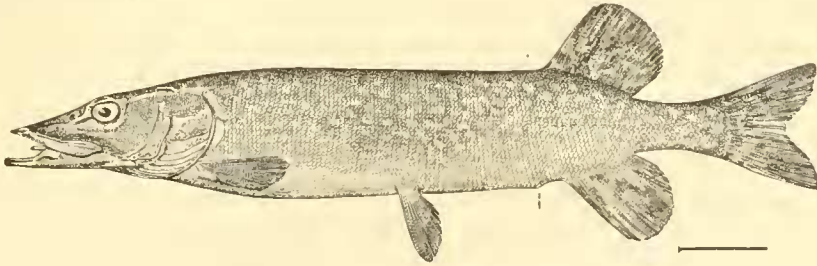


FIG. 22.—*Esox lucius* Linnæus.

Family 23. GASTEROSTEIDÆ. The Sticklebacks.

58. *Pygosteus pungitius* (Linnæus).

This species has been recorded by Turner (1886), from St. Michael. Gilbert (1895), from Nushagak and Naknek rivers. Rutter (1899), brook near mouth of Alitak Bay, Kodiak Island. Scofield (1896), Grantley Harbor. Nelson (1887), as *Pygosteus pungitius brachypoda*, from Andreafski, Yukon River, and St. Michael. Turner (1886), Sannak Island. Bean (1882), St. Paul, Kodiak Island; Unga Island; Iliuliuk Lake, Unalaska; St. Paul Island; St. Michael; Port Clarence; Elephant Point, Eschscholtz Bay; near Icy Cape, Arctic Ocean. Murdoch (1885), Point Barrow.

Numerous (probably 500) specimens taken by Dr. Gilbert in a small lake at Koggiung. Two specimens 2.26 and 1.75 inches long taken along with young salmon in sloughs or little pools of quiet water along edge of Karluk River near its source, by Mr. Rutter in 1903. These specimens differ from current descriptions, therefore, in having an increased number of spines, and the ventral spines somewhat shorter.

The following is a description of the larger specimen, 2.26 inches long:

Head 4 in body; depth 5; eye 3.75 in head; snout 3.75; maxillary 4; mandible 4; interorbital 4.6; dorsal $x-1, 9$; anal 1.9.

59. *Gasterosteus cataphractus* (Pallas).

Numerous specimens from the following localities: Admiralty Head and Kilisut Harbor near Port Townsend; Shawnigan Lake, Vancouver Island; Alert Bay; Mink Arm, Boca de Quadra; Loring (from both salt and fresh water); Lake McDonald and Yes Bay; Kasaan Bay; Ankan River; Karluk Lake and connecting streams and sloughs; Alitak Lake, Kodiak Island; St. Paul Island, Pribilof Group; Sitka; and Pablot Falls.

The species had been previously recorded by Turner (1886) from Sannak Island. By Bean (1882) from Sitka; Port Mulgrave, Yakutat Bay; Refuge Cove and Chugachik Bay, Cook Inlet; St. Paul, Kodiak Island; Sanborn Harbor, Unga Island; Humboldt Harbor and Little Koniushi Island, Shumagins; Iliuliuk, Unalaska; Amchitka; Kyska Harbor and St. Paul Island. Lakes of Kodiak Island and Karluk estuary (Rutter 1899). Grantley Harbor (Scofield 1899). As *Gasterosteus microcephalus* (Bean 1884) from Piseco Lake, Sitka; St. Paul, Kodiak; Chirikof Island; Iliuliuk Lake, Unalaska, and Mountain Lake, near Wards Cove.

The specimens from Karluk Lake were obtained by Mr. Rutter from a large school seen in the river near its connection with a side lake and from sloughs or pools of quiet water along the river near its source. These range in length from 2 to 4 inches. The largest of these last specimens have the lateral plates scarcely evident; the smaller specimens show no plates at all. Examples taken at Lake McDonald August 24 were full of nearly ripe eggs, as were also those taken at Kilisut Harbor July 1.

Among the great number of specimens collected by Mr. M. C. Marsh on St. Paul Island in 1906, nearly 200 small examples were obtained from a landlocked fresh-water lake and these are not so fully plated as are larger examples from the same lake. Many of the Loring specimens were infested with intestinal parasites.

Eighteen different localities in Alaska, eight of which are salt water, are represented in our collection of *Gasterosteus*. Every specimen from the salt water is fully plated. Those found in the lakes or well up the streams usually have fewer plates than those taken in or near the sea, the variation being from 3 plates to a fully plated condition. Those in a fresh-water landlocked lake on St. Paul Island, however, are fully plated. With this exception (and this lake is not strictly a fresh-water lake), our collections indicate that whenever sticklebacks begin living in fresh water they begin losing their plates, and a continued residence there tends to the disappearance of most of the plates.

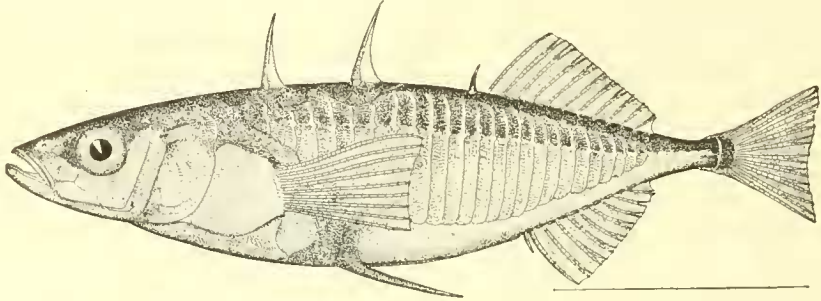


FIG. 23.—*Gasterosteus cataphractus* (Pallas).

An examination of our specimens from various localities gives the following results:

Hatchery Lake near Loring, 2 specimens, 6 plates; pubic plate and spines well developed, not reduced.

River connecting with side lake, Lake Karluk, 2 specimens, 4 and 6 plates; spines well developed; pubic plate not reduced.

Loring, 6 specimens, 3 plates, only 1 plate fully developed; pubic plate and spines not reduced; pectorals small.

Lake Karluk, about 20 specimens, 4 to 12 plates; pubic plate and spines not reduced.

Loring, outlet second lake, 1 specimen, 3 plates; spines and pubic plate well developed.

Loring, at head of bay, many small specimens, few plates; spines and pubic plates well developed.

Heckman Lake, 4 specimens, 3 plates; spines and pubic plate well developed.

Karluk Lake, 12 specimens, 3 to 8 plates; spines and pubic plate well developed.

Head of Mink Arm, 77 specimens, all fully plated; pubic plate and pectoral not different from fresh-water specimens.

Admiralty Head, 1 specimen, fully plated; spines and pubic plate well developed.

Kilisut Harbor, 13 specimens, fully plated; spines and pubic plates well developed.

Loring, near head of Bight, 2 specimens, fully plated; spines and pubic plate well developed.

Loring, at head of Naha Bay, 12 specimens, plates well developed; others well developed, as are the spines and pubic plates.

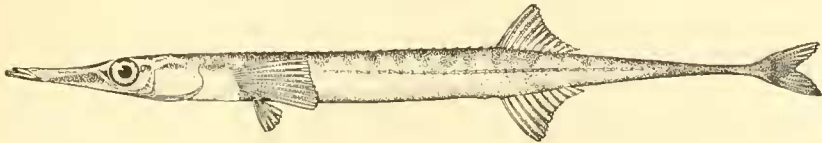
Kasaan Bay, 1 specimen, plates all developed.

Head of Yes Bay, 25 specimens, fully plated.

Family 24. AULORHYNCHIDÆ.

60. *Aulorhynchus flavidus* Gill.

Eleven specimens, 1.15 to 2.15 inches long, seined at Quarantine Dock, near Port Townsend: 3 specimens, 1.25 inches long, taken in kelp near pier at Port Townsend, 5 from Loring, and 1 from Alert Bay. The species has also been recorded from Sitka by Bean (1882.)

FIG. 24. *Aulorhynchus flavidus* Gill.

Family 25. SYNGNATHIDÆ. The Pipefishes.

61. *Siphostoma griseolineatum* (Ayres).

Four specimens, 4 to 9 inches long, taken at Loring; one a male, 6.75 inches long, had eggs and young in its pouch; 3 females, 6.5 to 8 inches long, seined at Kilisut Harbor; 2 females, 5.5 and 11.5 inches long, seined at Metlakahla; one specimen, 5 inches long, seined in Taylor Bay, Gabriola Island. We have also 2 specimens, one taken at Loring and one at Yes Bay in 1905, and one other taken at Port Ludlow in 1895.

Family 26. AMMODYTIDÆ. The Sand Launces.

62. *Ammodytes personatus* Girard.

Collections were made by the *Albatross* as follows: One specimen, 3.75 inches long, at Sucia Island, May 6, 1894; 13 specimens, 3.5 to 7 inches long, south side of Akatan Bay, Aleutian Islands, July 20, 1894; 42 specimens, 3 to 5 inches long, at Agattu Island, June 6, 1894; 6 specimens, 3 to 5 inches long, taken at Atka Island, June 10, 1894; one specimen, 4 inches long, at station 3595; 52 by Mr. Rutter at Uganuk in 1897; 2 specimens, 4 and 4.25 inches long, at Unalaska, July 2, 1900; 118 specimens, 2 to 6.25 inches long, were taken in 1903 at Admiralty Head: Loring; Metlakahla; Pablof Harbor; Uganuk, Uyak Bay, and Shakan Bay.

In addition to the specimens in the collection, the species was seined in abundance in Pablof Bay and also observed at station 4242 in Karta Bay, at Port Alexander, and Kilisut Harbor. It is frequently found in the stomachs of other fishes—in the stomach of a halibut at Loring, and many in the stomachs of sockeyes; many were also found in the stomach of a Dolly Varden trout.

The species has been recorded by Bean (1882), as *Ammodytes americanus*, from Sitka; Port Mulgrave, Yakutat Bay; Chugachik and Port Chatham, Cook Inlet; Semidi Islands; Humboldt Bay, Shumagins; Hiuliuk, Captains Harbor, and Chernoffsky, Unalaska; Constantine Bay, Amchitka; Port Clarence; and Point Belcher, Arctic Ocean. Also by Bean in 1884 (as *A. personatus*) from Wrangell and Port Chester. Gilbert (1895), Unalaska; Chernoffski; Herendeen Bay and Hagemeister Island. Nelson (1887), St. Michael; and Scofield (1899), Chignik and Port Clarence.

Small boys, seen using this fish at Sitka for bait in fishing for "black bass" (*Sebastes melanops*), called them "needlefish." They are abundant along the Alaskan coasts at least as far north as the Aleutian Islands, going in great schools and frequenting sandy shores, where they quickly bury themselves in the sand when disturbed. At Unalaska in 1892 one of us saw more than a barrel taken in one haul with a short seine. More delicious little fish probably do not exist. They are usually prepared by rolling in fine corn meal or cracker crumbs and frying in butter.

Family 27. BERVICIDÆ.

63. *Plectromus lugubris* (Gilbert).

Recorded from station 3327, north of Unalaska (Gilbert 1895), as *Melanphaes lugubris*.

64. *Plectromus cristiceps* (Gilbert).

One specimen 4.75 inches long from station 4267, off Cape Edgecumbe, in 922 fathoms.

Head 2.75 in length; depth 3.80; eye 5.3 in head; maxillary 2.3; mandible 2; interorbital 3.1; dorsal iii, 13; anal i, 8.

Head long, blunt anteriorly, remarkable for cavernous areas surrounded by membranous ridges, the eye surrounded by a raised rectangular area bordered above and below by raised crests; a fragile but sharp spine on snout and a horseshoe-shaped crest on top of head, the rounded border pointing anteriorly; a raised area ending in a ridge in front of preopercle and resembling the latter in outline; a fan-shaped striate patch on upper posterior corner of opercle; mouth wide, slightly oblique, the gape reaching to vertical of pupil. Dorsal rather long, its base 1.5 in head, its origin halfway between tip of snout and base of caudal; anal short, its base 3.5 in head, its origin about middle of base of dorsal; ventrals short, inserted immediately below pectorals; pectoral long and slender, reaching to posterior end of dorsal, about 1.2 in head, narrow (about 13-rayed), inserted close behind gill-opening and about two-thirds distance from dorsal to ventral outline. Scales apparently deciduous, the scars only remaining, largest anteriorly, 24 in longitudinal series, 9 in transverse series; no lateral line.

Predominating color black; fins dark; crests, occiput, and area about eye white; positions occupied by scales lighter, border area black.

Family 28. ZAPRORIDÆ.

65. *Zaprora silenus* Jordan.

Known only from 2 specimens, the type and one other now in the Provincial Museum at Victoria, both taken in Nanaimo Harbor, British Columbia.

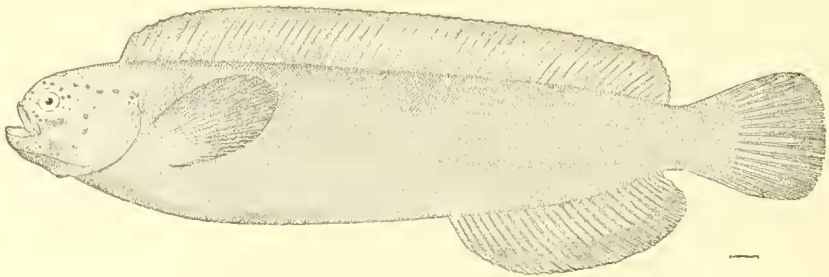


FIG. 25.—*Zaprora silenus* Jordan.

Family 29. EMBIOTOCIDÆ. The Viviparous Surf-fishes.

66. *Cymatogaster aggregatus* (Gibbons). *White Surf-fish; Viviparous Perch.*

This interesting fish occurs from Todos Santos Bay, Lower California, northward at least as far as Yes Bay, Alaska. It was found by us at the following places: Marrowstone Point near Port Townsend, June 29; Kilisnoet Harbor near Port Townsend, July 1; Taylor Bay and Gabriola Island near Nanaimo, June 20; Union Bay, Nanaimo, June 23; Fort Rupert, June 25; Boca de Quadra, July 6; Yes Bay and Karta Bay, July 8; Loring and Klawak, August 8. It was abundant at all these places, except at Yes and Karta bays, and many specimens were secured at all of them, but none was seen farther north than Yes Bay. Bean (1883) records it from Wrangell. The specimens collected up to July 1 were mature, the females all being heavy with young. In some instances the young had begun to escape, as some were found in the water, and in nearly all cases they could be easily pressed from the body of the mother. Frequently they were able to maintain themselves in an upright position in the water and swim about.

A large number of examples of this species were examined for the purpose of determining the extreme and average sizes of adult males and females, the number and size of young at time of liberation, and the position of the young in the ovary. It was found that the average total length of all the

females (106) examined was 5.25 inches; of the (44) males, 3.84 inches. The extremes were: Females, 3.25 and 8 inches; males 3.31 and 5.69 inches. The number of young in 81 females examined varied from 8 to 36, the average being 15.76. The position of the young in the ovary was determined in 54

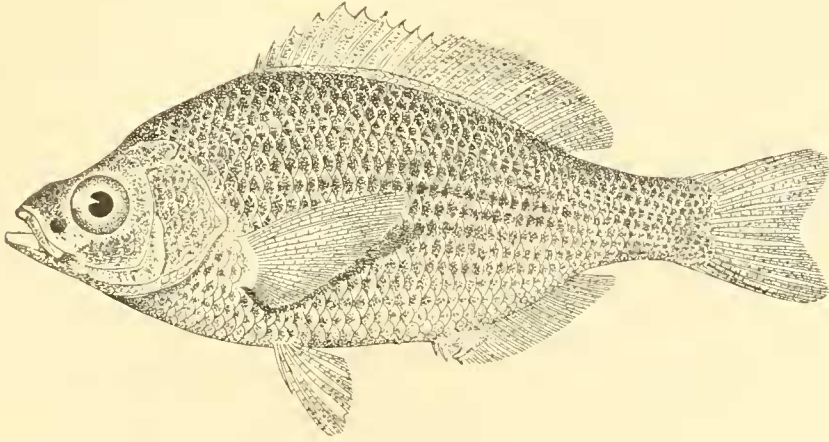


FIG. 26.—*Cymatogaster aggregatus* (Gibbons). Male.

fishes. They were found to contain a total of 813 young, 652 or 80 per cent of which were lying with the head toward the head of the mother fish, while 161 or 20 per cent had the head toward the tail. In one instance all the young (11) had the head forward, and in every case but one the majority of the young

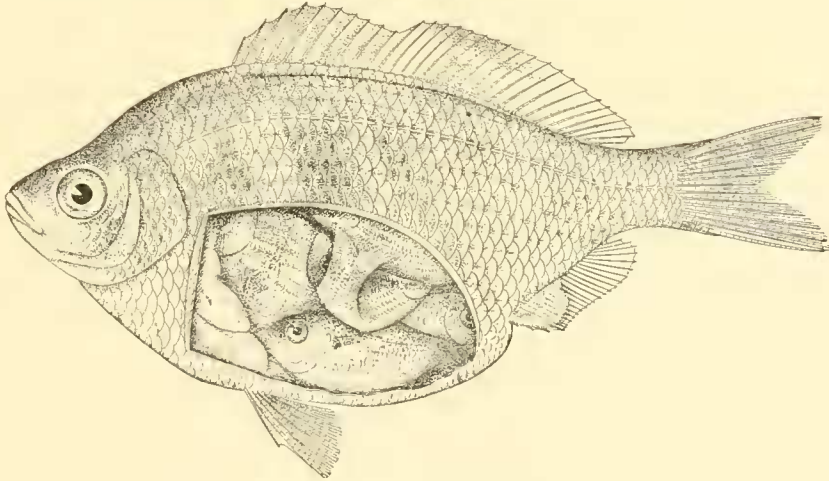


FIG. 27.—*Cymatogaster aggregatus*. Female.

had the head forward. The one exception was with a 5.5-inch fish with 12 young, 9 of which had the head toward the tail. The young were quite uniformly 1 inch to 1.25 inches in length. Those of an unusually large female (6.75 inches) were each 1.63 inches long.

The table on page 278 gives these data in detail.

POSITION OF YOUNG IN GRAVID EXAMPLES OF CYMATOGASTER AGGREGATUS.

No. of speci- men.	Locality and date.	Length.	Young			Total young.	No. of speci- men.	Locality and date.	Length.	Young			Total young.
			with head for- ward.	with head back- ward.						with head for- ward.	with head back- ward.		
		<i>Inches.</i>						<i>Inches.</i>					
1	Gabriola Island (June 20)	5.0	13	1	14	42	Union Bay, Vancouver						
2	do	5.25	12	5	17		Island (June 23)	4.75	5	3	8		
3	do	5.5	13	5	18	43	do	6.0	15	1	16		
4	do	5.5	10	6	16	44	do	5.25	11	6	17		
5	do	5.5	11	4	15	45	do	5.5	11	5	16		
6	Union Bay, Vancouver					46	do	6.0	16	3	19		
	Island (June 23)	6.0	14	5	19	47	do	5.0	11	2	13		
7	do	5.5	15	2	17	48	do	6.0	14	3	17		
8	do	5.0	10	1	11	49	do	5.5	12	3	15		
9	do	5.5	10	4	14	50	do	4.75	10	2	12		
10	do	5.0	10	5	15	51	do	5.0	11	1	12		
11	do	6.0	10	3	13	52	do	5.0	10	2	12		
12	do	6.5	25	2	27	53	do	5.0	7	3	10		
13	do	5.5	15	5	20	54	do	3.5	12	3	15		
14	do	5.5	14	2	16	55	Gabriola Island (June 20)	5.0			15		
15	do	5.0	12	3	15	56	do	5.5			20		
16	do	6.0	12	4	16	57	do	6.0			27		
17	do	5.0	8	2	10	58	do	5.5			17		
18	do	5.0	16	2	18	59	do	6.0			21		
19	do	6.0	13	2	15	60	do	5.0			14		
20	do	5.5	11	4	15	61	do	3.75			15		
21	do	5.0	11	3	14	62	do	5.75			18		
22	do	5.0	11	0	11	63	do	5.5			15		
23	do	5.0	16	1	17	64	do	5.25			17		
24	do	6.5	19	3	22	65	do	6.0			21		
25	do	5.5	9	6	15	66	do	5.0			11		
26	do	5.0	13	1	14	67	do	5.5			20		
27	do	5.0	9	5	14	68	do	5.25			11		
28	do	5.5	12	2	14	69	do	5.25			15		
29	do	5.5	15	2	17	70	do	5.75			20		
30	do	5.5	12	2	14	71	do	5.0			12		
31	do	5.0	9	4	13	72	do	5.75			20		
32	do	5.0	9	3	12	73	do	5.0			18		
33	do	5.0	9	3	12	74	do	5.5			20		
34	do	5.0	7	5	12	75	do	5.5			21		
35	do	5.0	12	1	13	76	do	5.0			13		
36	do	4.75	9	2	11	77	do	5.25			16		
37	do	5.5	13	1	14	78	do	5.0			12		
38	do	6.0	23	1	24	79	do	5.0			11		
39	do	5.5	3	9	12	80	do	5.0			24		
40	do	6.5	20	2	22	81	do	5.0			20		
41	do	5.25	12	1	13	82	Kilisut Harbor (July 1)	6.75			36		

Color of female in life, silvery; back olive-greenish or brassy; side with 2 broad vertical brassy bars, between which and in front and back of which the scales are whitish, and with a large black blotch of small specks; top of head olive; belly white; dorsal and caudal olive, other fins white.

"Surf-fish" is a very appropriate name for this little species. During the spawning season it swarms in great numbers in the surf or in shallow water along sandy shores. Every haul of the seine at Kilisut Harbor and about Nanaimo and Fort Rupert resulted in the capture of great numbers.

The spawning season on the coast from Puget Sound to Fort Rupert is evidently during the last days of June and the first days of July, and the fish seem to come into shallow water along the shore to liberate their young. There is evidence indicating that the more quiet, shallow reaches of shore are then selected as affording the least danger to the delicate young fish. The fact that numerous females captured at Karta Bay July 11 were all spent fish indicates that the spawning period is a brief one.

The number of females seems to be in excess of the males. Of 90 fish examined at Fort Rupert, 66 were females, and about the same proportion held elsewhere. The preponderance of females may, however, be more apparent than real. The males are considerably smaller than the females, and it may well be that some were overlooked in the mass of material resulting from each seine haul.

The white surf-fish will take the hook, but is too small to be of much interest as a game fish. It is said to be a very fair pan fish.

67. *Tæniotoxa lateralis* (Agassiz). *Blue Perch; Striped Surf-fish.*

The only example seen was seined at Kilisut Harbor, July 1. Color in life, reddish brassy, greenish on head and back; side and back with many narrow, pale bluish lines, half width of brassy interspaces; underparts paler brassy; fins dusky brassy.

68. *Damalichthys argyrosomus* (Girard). *White Viviparous Perch; Porgee.*

This species was found at Diamond Point, Kilisnoo Harbor, and Marrowstone Point, June 27 and July 1; Taylor Bay, Gabriola Island, June 20; and Union Bay, Vancouver Island, June 23. It was not abundant anywhere, but was most common at Union Bay. A female examined at Gabriola Island was 14 inches long and contained 23 young, each about 1.9 inches long. Four other examples measured were 2.75, 5.25, 4.75, and 6.5 inches long, respectively.

A specimen 2.62 inches long has the pectorals dark, almost black; anal anteriorly dusky; caudal dusky at base, and a conspicuous black spot about the middle of the dorsal.

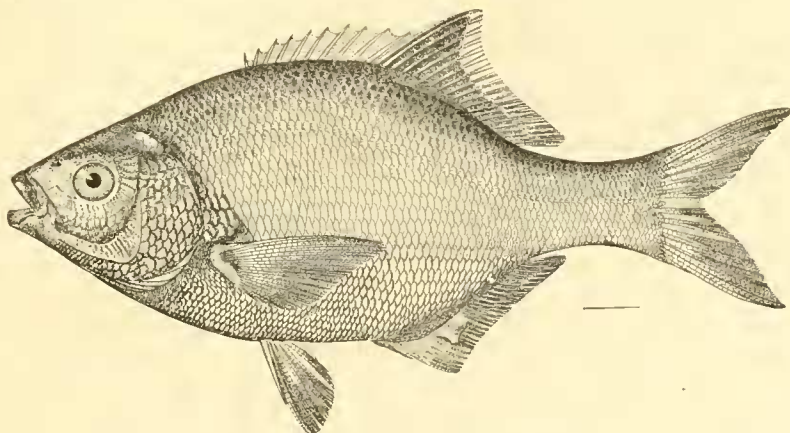


FIG. 28.—*Damalichthys argyrosomus* (Girard).

Family 30. SCORPENIDÆ. The Scorpion-fishes.

69. *Sebastolobus alascanus* (Bean).

The collection contains 11 specimens of this species, the localities represented being stations 4238 to 4241 (Behm Canal) and 4302 (Sumner Strait, off Shakan). The depths range from 169 to 256 fathoms. The specimens range in length from 3.4 to 23 inches.

Dorsal XVI in 8 specimens, XVII in 3. In two small examples (3.4 and 5 inches total length) the black spots on the spinous dorsal are quite distinct and the pectorals are marbled with black and white. The ventrals also are dusky, and the soft dorsal of the smaller specimen is dusky, and has 3 or 4 small roundish white spots. Two adults (nos. 2878 and 2879) taken at station 4238, in Behm Canal, were, in life, bright rose-red all over, paler below, especially on lower parts of head; fins all red; caudal with some black on outer parts of membranes; pectoral also with some black on interradial membranes; inside of opercle rose-color.

Originally described by Bean (1891) from Albatross station 2853, off Trinity Islands. Recorded also by Gilbert (1895) from stations 3227, 3324, 3330 to 3332, and 3337 to 3340, in Bering Sea, north of Unalaska Island, or in the north Pacific, southeast of Unimak Island.

This species reaches a length of 2 feet or more. Its range extends from California to Bering Sea. It is usually found in rather deep water, 100 to 800 fathoms. Its flesh is palatable and the species should be of some value as a food fish.

70. *Sebastolobus altivelis* Gilbert.

Originally described by Gilbert (1895) from station 3338, south of the Alaskan Peninsula. No other specimens have been taken in Alaskan waters, but it has been found to be almost equally abundant with *S. alascanus* off the coast of California as far south at least as San Diego, in relatively deep water. It reaches a foot in length.

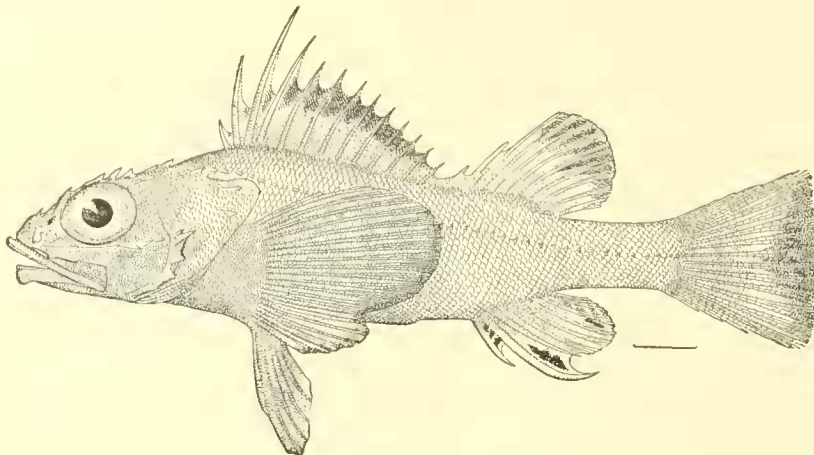


FIG. 29.—*Sebastolobus altivelis* Gilbert.

71. *Sebastes paucispinis* (Ayers). *Boccacio*.

This species occurs from San Diego to Barclay Sound, British Columbia, in rather deep water. We have one specimen 8 inches long, from Barclay Sound, collected by the *Albatross* September 27, 1888. The species reaches a length of 2.5 feet and a weight of several pounds.

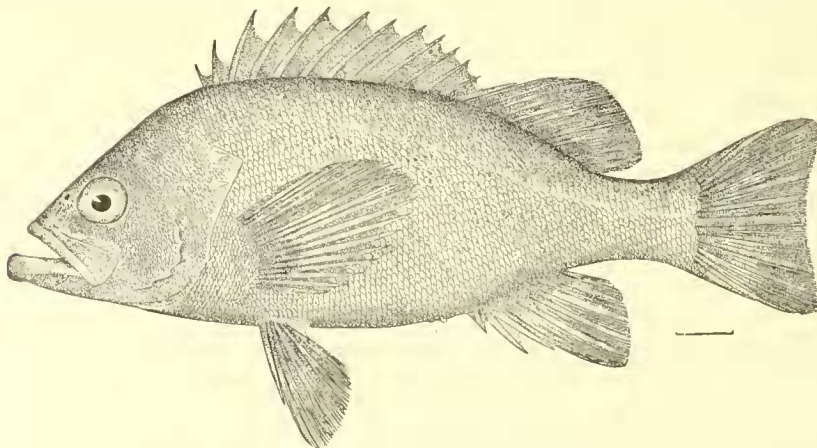


FIG. 30.—*Sebastes melanops* (Girard).

72. *Sebastes melanops* (Girard). *Sitka* "Black Bass."

This species was obtained at Nanaimo, in the surface tow-net, at Sitka, Naha Bay, and Port McArthur with hook and line, and by Mr. Rutter at Karluk. Four specimens were seined at Metlakahla, and several were seen at Shakan. They range in length from 6.5 to 15.25 inches. We have examined also an example 8.5 inches long collected by the *Albatross* at Barclay Sound, British Columbia, September 23, 1888, and also 2 specimens 7.5 and 8.5 inches long collected in 1893 at St. Paul, Kodiak, and 7 others 6 to 13.5 inches long collected in 1897 at Redfish Bay and Hunter Bay.

The range of this species is from Monterey Bay to Kodiak Island, it being most abundant northward. It reaches a length of 18 to 20 inches. Bean (1882) has recorded it from Sitka and St. Paul, Kodiak.

These fish take the hook freely and afford some sport as game fish. At Sitka July 28 they were biting well and many were caught from the wharf. Pieces of meat were used for bait and the fish were found in water 6 to 18 feet deep. They usually take the hook rather quietly and at first make a pretty good fight, but soon give up and allow themselves to be lifted out of the water without much struggle. They are therefore a "boy's fish," which will not appeal strongly to the experienced angler, but they are good food fish and bear a certain resemblance to the black bass (*Micropterus*). Color in life, olive-brown, blotched with dirty red.

73. *Sebastes ciliatus* (Tilesius).

Two specimens, 3.75 and 7.25 inches long, from station 4285 in Chignik Bay. These have 14 dorsal spines each. In all other respects they agree perfectly with a large specimen (no. 2865), 13 inches long, taken with hook and line at Loring, July 7. We have also 3 specimens 12 to 13.5 inches long collected

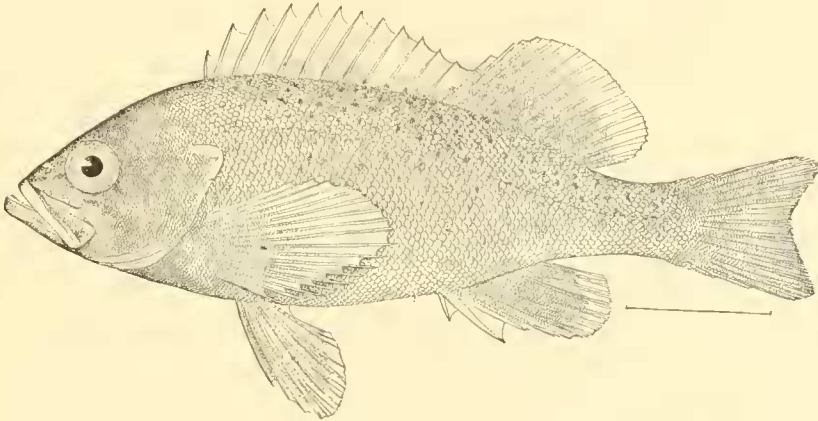


FIG. 31.—*Sebastes ciliatus* (Tilesius).

by the *Albatross* in 1897 at Redfish Bay and Killisnoo. The species is now known from Kodiak Island, Aleutian Islands, Chignik Bay, Loring, Mary Island, Tolstoi Bay, Nakat Harbor, and Port Chester.

As our 13-inch specimen is more than twice the size of those upon which current descriptions were based, we give the following notes on it: Head 3.2 in length; depth 2.8; oblique rows of scales 60, plus a few small scales on base of caudal fin; pores 50; eye 4 in head, equaling snout; interorbital width about equaling eye; fifth dorsal spine 2.75 in head.

Our examples have been compared with the 3 small specimens from Kodiak in the National Museum and one 7.5 inches long collected by the *Albatross* at Kodiak Island, August 14, 1888, with which they agree.

Epinephelus ciliatus Tilesius, Mem. Ac. Sci. St. Petersburg, IV, 1810, 474, "Camtschaticus et Americanus": no definite locality given, probably from about Kodiak Island.

Perca variabilis Pallas, Zoogr. Rosso-Asiat., III, 241 1811, Aleutian Islands. (Type in museum of Berlin: red examples of *S. alutianus* included as the summer coloration.)

74. *Sebastes mystinus* Jordan & Gilbert. *Black Rockfish.*

One specimen (no. 1370) 14 inches long, collected by the *Albatross* at Attu Island in 1893, and 2 others (no. 2165 and 2166), each 15 inches long, collected by the same vessel at Killisnoo. The species ranges from the Aleutian Islands to San Diego, and about San Francisco is the most abundant of the family. It occurs in shallow water and reaches a length of about 14 inches.

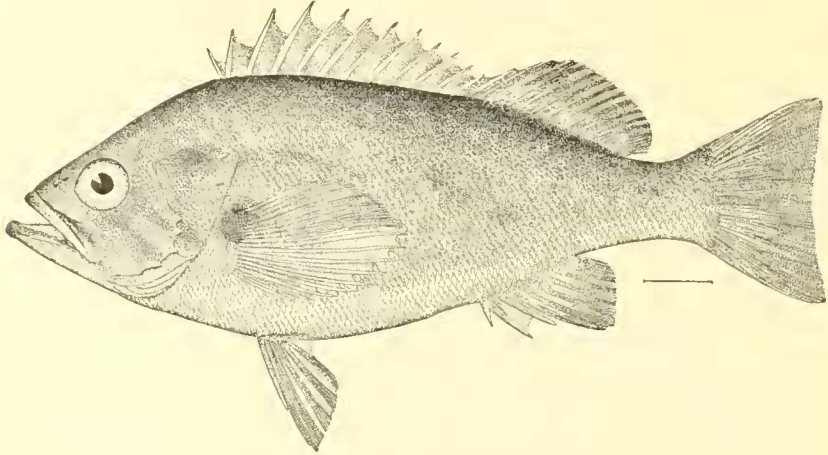


FIG. 32.—*Sebastes mystinus* Jordan & Gilbert.

75. *Sebastes brevispinis* (Bean).

One fine specimen 14½ inches long (no. 2864), taken on hook at Loring by Mr. F. M. Chamberlain in July. Dorsal xiii, 14; anal vii, 7; 61 pores in lateral line; only the nasal, preocular, and parietal spines present; mandible apparently naked; gillrakers 10 + 25, the longest 1.75 in eye.

The collection contains also 4 other specimens which we refer to this species, seined at Metlakahtla, July 10. They are each about 4 inches in length and agree in all essentials with the large specimen.

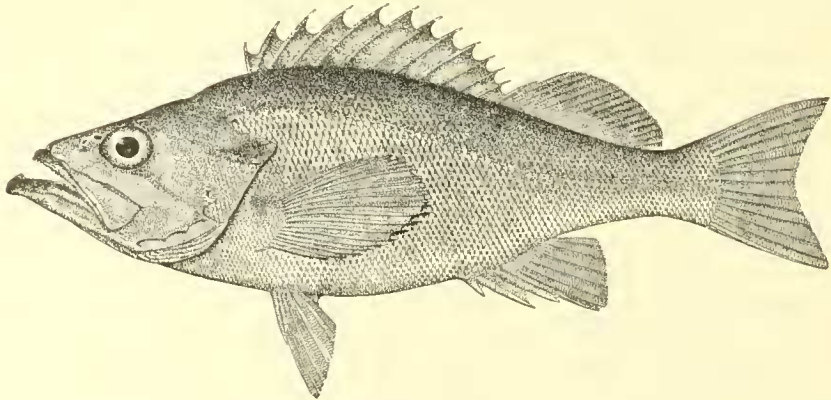


FIG. 33.—*Sebastes brevispinis* (Bean).

Each of them, however, shows a very distinct black spot on the membranes of the ninth to thirteenth dorsal spines; colors otherwise agreeing with the large examples.

Originally described by Bean (1884) as *Sebastichthys proriger brevispinis* from Hassler Harbor.

This is a rare species, as yet known only from the type and the 5 specimens here recorded.

76. *Sebastes alutus* Gilbert.

The collection contains 20 specimens of this species, representing the following localities: Dredging stations 3486, 3489, 3490, 3449, 3459, 4223, 4227, 4228 (4 specimens), 4249, (tag no. 2898), 4253 (tag no. 2905), 4283, 4284 (3 specimens), 4285, 4289 (5 small specimens and one large example no. 3000), 4290 (tag no. 2995), and 4292. These specimens range in length from 4.4 to 15 inches. We have also examined 8 small specimens 3 to 5 inches long dredged among the Santa Barbara Islands at station 2840, and 2 specimens (paper tag no. 110 and 111), each about 4.5 inches long, from Albatross station 3599, June 9, 1894, in Bering Sea. These specimens had a number of parasites upon them.

All these specimens agree in the main with the excellent original description of the species. Specimen no. 2898, 9.25 inches long, from Eastern Passage (vicinity of Stikine River Delta), shows some differences, the body being more slender, the eye larger, snout longer, maxillary longer, and the mandible more projecting. It gives the following measurements: Head 2.75; depth 3.5; eye 3.1; snout 4.4; maxillary 2.1; dorsal xiii, 15; anal iii, 8; gillrakers 10 + 28.

The young differ somewhat from the adult. The following detailed description is based on a specimen (no. 97) 4.5 inches long from station 4285: Head 2.8 in body; depth 3.5; eye 3.1 in head; maxillary 2.2; mandible 1.8; snout 4; interorbital 4.8; dorsal xiii, 15; anal iii, 8; ventrals i, 5; pectorals 18; pores 47+1 on tail, about 51 transverse series of scales.

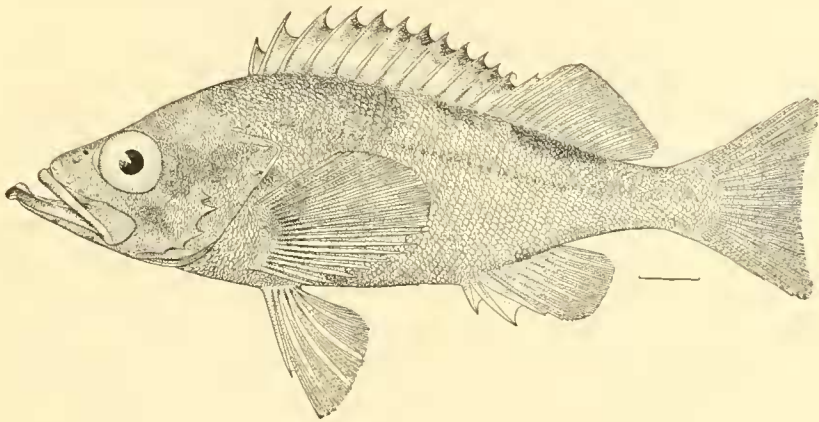


FIG. 34.—*Sebastes alutus* Gilbert.

Body ovate, compressed, both dorsal and ventral outlines gently curved; head moderate; mouth medium, slightly oblique, the tip of premaxillary on a level with pupil, the gape extending to under nostril; maxillary extending to a little beyond vertical at middle of orbit; mandible to posterior margin of pupil; teeth minute, in narrow bands on palatines, a triangular patch on vomer, bands on upper jaw terminating anteriorly in rounded lobes, leaving a vacant space at symphysis, the teeth each side of vacant space slightly enlarged; band on lower jaw narrow, the symphyseal patch somewhat raised and its teeth somewhat enlarged, this patch fitting into the vacant space above; lower jaw slightly projecting, entering profile, a small symphyseal knob; tongue rather large, fleshy, acute; buccal cavity rather pale; interorbital space tolerably broad, 1.5 in eye, and very slightly concave; cranial ridges rather sharp and tolerably well defined, the following spines present: nasal, preorbital, supraorbital, postorbital, tympanic and parietal, all these small, but stout and sharp; a stout humeral spine; opercular spines two, triangular, united at base; preopercular spines five, rather stout. Scales on jaws, cheeks, and occiput, a barren patch above suborbital stay; scales on body very weakly ctenoid, as are those on occiput; scales on jaws, cheeks, and breast cycloid. Dorsal fin rather low, its longest (fifth) spine 2.45 in head, longest ray about 3 in head (probably broken); base of fin about 1.8 in body, its origin above tip of opercular flap; distance from tip of snout to origin about 2.9 in body; fin membranes somewhat incised, leaving about one-third of the spines exerted; border of fin not deeply emarginate; anal not high, length of longest ray 2.1 in head, the base the same length; second anal spine longest, not conspicuously stouter than others, its tip reaching slightly beyond tip of third spine but not to tip of

nearest rays; ventrals rather narrow, acute, length 1.6 in head, tips not reaching vent by quite a perceptible distance; pectorals rather broad, acute, 1.25 in head, tips reaching nearly to vent, lower 9 rays very slightly thickened, not branched, upper rays branched; caudal 1.55 in head, apparently truncate; gill cavity somewhat dusky; gillrakers 11 + 25, rather long and slender, 1.9 in eye; peritoneum black.

Color in alcohol, light yellowish-brown above, somewhat silvery below; occiput, line along base of dorsal, and spot on opercle dusky; dorsal more or less dusky, the edge of the membrane blackish.

77. *Sebastes pinniger* (Gill). *Orange Rockfish*.

One specimen 5 inches long from station 4220 in Admiralty Inlet, July 1. It is a female with well advanced eggs.

Head 3.25 in body; depth 3; eye 3.5 in head; maxillary 2.1; dorsal xiii, 14; anal iii, 7; scales 45.

A specimen 4.5 inches long from station 4193. Dorsal xiii, 14; head 3; eye 3; gillrakers 12 + 26, long and slender.

Another example 3.5 inches long from station 4205.

This species reaches a length of 2 feet or more and ranges from San Diego to Puget Sound.

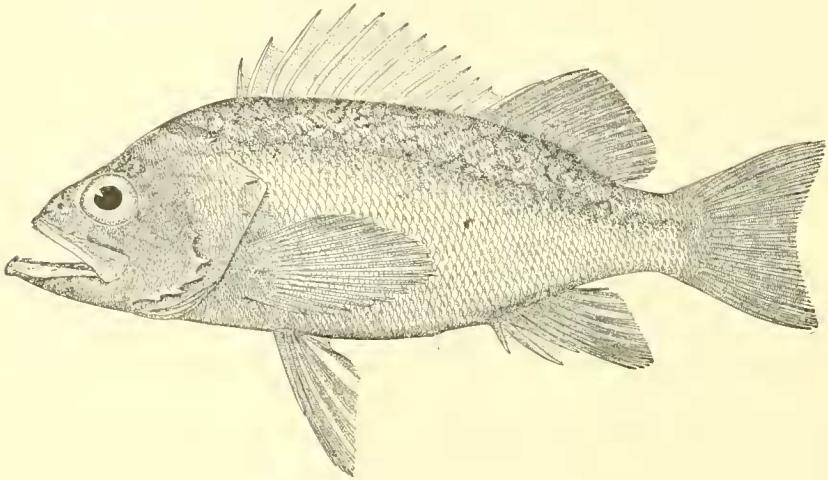


FIG. 35.—*Sebastes pinniger* (Gill).

78. *Sebastes aleutianus* Jordan & Evermann. (Pl. xvi.)

This species is certainly known only from the type locality, Shelikof Strait, off Kodiak Island.

79. *Sebastes saxicola* (Gilbert).

Two specimens 2.5 and 2.75 inches long seined at Metlakahtla, and 3 others, 2.5, 4.25, and 6 inches, dredged at station 4228 (Naha Bay).

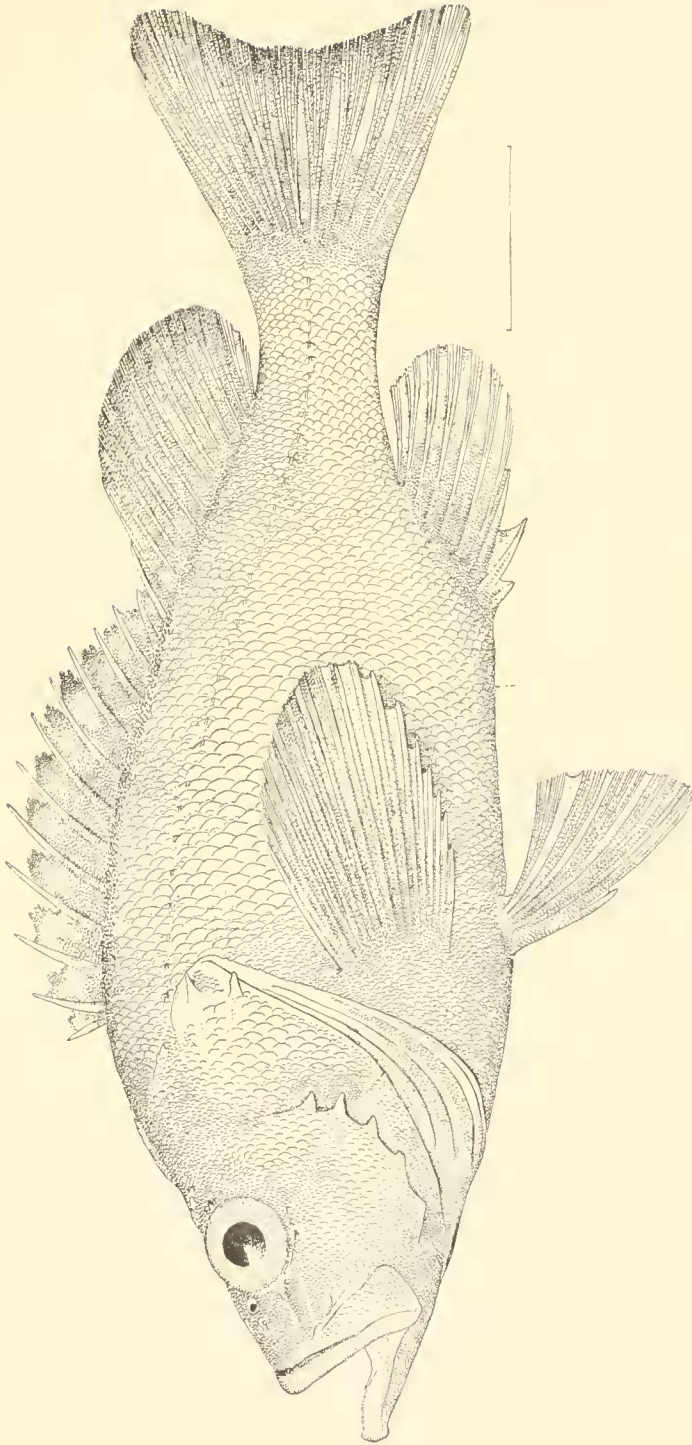
Head 3; eyes 2.75; snout 4; interorbital 4; pores 43; scales about 50; dorsal xiii, 14; anal iii, 7; gillrakers 11 + 23, long and slender, 2 in eye.

An example 9 inches long from station 3129, off the coast of central California, March 13, 1890, has the head 2.75; snout 4.25; depth 3.2; gillrakers 10 + 23, 2.1 in eye; eye 3.2. Longest dorsal spine 2.5 in head.

Another example (paper tag no. 102), from Barclay Sound, had the gillrakers 9 + 22, long and slender, 2.2 in eye.

We have compared our specimens with others in the National Museum and find them identical.

This fish ranges from southern California to southeast Alaska in waters of moderate depth. It reaches a foot in length.



SEBASTODES ALEUTIANUS JORDAN & EVERMANN. TYPE.

80. *Sebastes swifti* Evermann & Goldsborough, new species.

Head 2.65 in body; depth 3.1; eye 3.2 in head; snout 4.2; maxillary 2; mandible 1.8; interorbital about 2 in eye, 6 in head; dorsal xiii, 13; anal iii, 7; scales 42 in oblique series, about 32 pores.

Body oblong-ovate, compressed, the dorsal and ventral contours gently curved, the dorsal sloping rather gently both ways from the nape: caudal peduncle rather slender, its least depth 1.15 in eye; head large, bluntish; interorbital space rather narrow, somewhat concave, a pronounced ridge inside of each supraocular ridge; nasal, preocular, supraocular, postocular, tympanic, parietal, nuchal, and coronal spines all present, rather strong; preorbital narrow, with two broad flat lobes on the upper half; two broad flat humeral spines; opercular spines strong, somewhat diverging; preopercular spines moderately strong, the second longest, the first, second, and third projecting backward, but somewhat diverging, the fourth and fifth short and blunt, projecting downward and backward, all about equally spaced; teeth in rather narrow villiform bands on both jaws and palatines, a triangular patch on vomer; the band of teeth on upper jaw broadening to rounded lobes anteriorly, leaving a small, naked interspace at the symphysis into which the symphyseal knob of the lower jaw fits; the tongue small, short, and broadly rounded; maxillary reaching vertical at posterior edge of pupil, its width at the tip 2 in eye; lower jaw scarcely projecting; the mouth somewhat oblique; premaxillary on a level with lower edge of pupil; gillrakers 8+21, rather long and slender, the longest about 2 in eye. Dorsal long, its origin

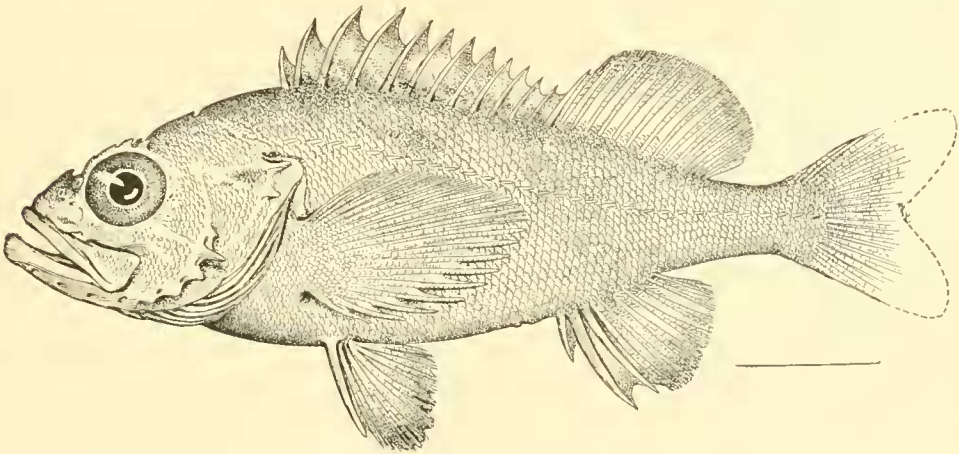


FIG. 36.—*Sebastes swifti* Evermann & Goldsborough, new species. Type.

a little in front of the rounded opercular flap, the distance from tip of snout to origin of dorsal equaling the length of head; base of dorsal about 1.8 in length of body; dorsal spines moderately strong, curved, the longest about equaling distance from tip of snout to middle of pupil; dorsal rays somewhat shorter; notch between spinous and soft dorsal not pronounced; second anal spine strong, curved, about equaling the third in length; ventrals short, not reaching vent; pectorals long, reaching vertical at vent; scales rather adherent, finely ctenoid; top of head, opercles, cheek, and maxillary scaled; mandible naked.

Color in alcohol, pinkish-brown, with indistinct, dusky, black patch above lateral line; cheek somewhat dusky, a black patch on upper edge of opercle and a smaller one at lower end; axil black; dorsal, anal, caudal, and ventrals tipped with black; inside of mouth pale; under side of opercle posterior to pseudobranchiae with a black patch.

This species appears to be related to *Sebastes crameri*, from which it differs in the narrower and more concave interorbital, the stronger ridges on the head, the stronger cranial spines, the presence of coronal spines, the smaller eye, the longer maxillary, the less strongly arched body, and the fewer pores in the lateral line.

Our collection contains two specimens—the type, no. 57821, U. S. National Museum (field no. 28721), 6.25 inches long, from Albatross station 4234 in Yes Bay, Alaska; and the cotype, no. 2893 (no. 5228, Bureau of Fisheries), 3.5 inches long, from Albatross station 4246, Kasaan Bay, Alaska.

This species is named in honor of the late Lieut. Franklin Swift, U. S. Navy, the efficient commander of the *Albatross* during the Alaska investigations in 1903.

81. *Sebastes diploproa* (Gilbert).

The collection contains 2 small specimens (no. 2784 and 2785), 3.25 and 3.5 inches long, dredged at station 4191, in Nanaimo Harbor, June 19. We have also examined a specimen (no. 101) 6.75 inches long, collected by the *Albatross* in 1890, probably off the California coast.

No. 2784 in life was light red, brownish on back, coppery on head; belly below lateral line abruptly silvery, scarcely washed with red; back with 5 obscure dull orange saddles, very diffuse, extending below lateral line, the one below soft dorsal broadest; head all red, the opercle with many dark dots; dorsal red, slightly orange shaded, pinkish at tips, the soft dorsal with a black cross-blotch about half-way up from behind third to sixth soft ray; black on membranes, not on rays; caudal faint orange, base reddish, tips pale; anal like soft dorsal, the black blotch fainter, larger, from behind second spine to third soft ray; pectoral and ventral pinkish-red; inside of mouth red; gill-cavity white; peritoneum black.

Head 2.75 in length; depth 3.1; eye 3.3 in head; snout 5.1; maxillary 2.25; mandible 1.9; inter-orbital 1.5 in eye, 4.5 in head; dorsal xiii, 12; anal iii, 8; pores in lateral line 34 to 41. Nasal, pre-ocular, postocular, tympanic, and parietal spines present, all well developed; preorbital with 2 blunt diverging spines; 2 small humeral spines; gillrakers 11+23, long and slender, 2 in eye.

No. 2785 has more black on second dorsal, less on anal; membranes of spinous dorsal dusky edged; a little dusky on upper edge of opercle; general color light brick red, the belly abruptly silvery.

These specimens have been compared with the types in the National Museum, with which they are found to agree.

The species reaches a length of a foot or less, and occurs on our Pacific coast from the Coronado Islands northward to Nanaimo.

82. *Sebastes introniger* (Gilbert).

One small specimen 2.75 inches long, dredged at station 4243, in Kasaan Bay, agrees in most respects with the original description of this species.

Head 2.75; eye, 2.75; dorsal xiii, 14; anal iii, 6; scales about 45, 31 pores; gillrakers 8+20, rather long and slender, 2 in eye.

Four specimens, 3.85 to 4.75 inches long from station 4223, in Boca de Quadra. These do not show the black gill-cavity and mouth which *introniger* is said to have. We have one other specimen, no. 1088, 20 inches long, dredged at station 3324, Bering Sea, August, 1890. The species has also been recorded from Bering Sea at stations 3311, 3317, 3324, and 3331 (Gilbert 1895). The known range of this fish is from Santa Barbara to Bering Sea, in waters of moderate depth.

83. *Sebastes ruberrimus* Cramer. *Red Rock Cod; Red Rockfish.* (Pl. XLII.)

The collection contains 1 large specimen (no. 2868) 12 inches long from Boca de Quadra, where it was caught on hook and line, July 5, at a considerable depth. When brought to the surface its stomach had been thrown out into its mouth. This specimen agrees with current descriptions. (The colored painting was made from life, from an example about 2 feet long, taken at Loring, where the species is not uncommon.)

Gillrakers 9+18, short, rough, clavate, 3 in eye, first 5 on short arm and last 7 on long arm mere tubercles. Head 2.6; depth 2.6; eye 4.5; dorsal xiii, 15; anal iii, 7; scales 50, pores 44; maxillary 2.1; mandible 1.66.

We have also 3 specimens 18, 19, and 14 inches long, collected respectively at Hunter Bay, Mary Island, and Mink Arm, and a specimen 19 inches long collected in Union Bay. The species has been recorded by Bean (1882), as *Sebastichthys ruber*, from off Point Bingham; Jacobi Island; Gulf of Alaska; and Kygani Strait.

The red rockfish is one of the largest of the family. It attains a length of more than 2 feet and a weight of many pounds. As a food fish it is of considerable importance, the flesh being fairly firm and of good flavor, and it takes the baited hook freely and possesses some game qualities. It is known to occur from San Diego to Boca de Quadra and Loring in southeast Alaska in moderate depths.

84. *Sebastes rosaceus* (Girard). *Orange-red Rockfish*.

Two specimens (no. 2822 and 2823), 5.2 and 9 inches long, seined near Marrowstone Point, June 29, and 1 example (paper tag no. 105), 9.5 inches long, collected by the *Albatross* at station 2887, off the coast of Oregon, October 19, 1888.

The membranes of the dorsal and anal fins are deeply incised, being very different from all other species with which we are acquainted. In the soft dorsal and anal the interradial membranes do not reach more than two-fifths of the length of the rays. We have compared our specimens with 9 others from Santa Barbara and find that some of the latter show the same structure, though the majority show little or no incision of these membranes.

This species reaches a length of a foot or more and is a good pan fish. Its range extends from San Diego to Puget Sound.

85. *Sebastes rupestris* (Gilbert).

The collection contains 3 specimens 4.75 to 6 inches long (nos. 2906-8) from station 4253, in Stephens Passage, and one 6 inches long from station 4231 in Behm Canal. The last specimen has 14 spines in the dorsal, but in all other respects it agrees with the other specimens. Maxillary in all three specimens reaches to posterior margin of pupil; gillrakers 9 + 16 (+4 tubercles), more numerous than usually given in descriptions.

Comparison of our specimens with the types shows no important differences. The black on the fins in the types has faded, while in ours it is still very distinct. Ours also have a large dark opercular spot not mentioned in the description of the types. We have also compared our specimens with the types of *Sebastichthys aurora* and find them to agree fully. We are unable to discover any characters by means of which they can be distinguished, and are therefore compelled to unite these two nominal species. *S. rupestris* as here understood ranges from the Santa Barbara Islands northward to Southeast Alaska (Stephens Passage and Behm Canal).

Sebastichthys rupestris Gilbert, Proc. U. S. Nat. Mus., XIII, 1890 (July 1), 76, Albatross station 2946, in 150 fathoms off southern California.

Sebastichthys aurora Gilbert, Proc. U. S. Nat. Mus., XIII, 1890 (July 1), 80, Albatross stations 2948 and 2960, in 266 and 267 fathoms, off southern California.

86. *Sebastes dalli* (Eigenmann & Beeson).

A single specimen (no. 2820), 8 inches long, taken on hook at Union Bay, June 23. It appears to agree with *S. dalli*, except that the maxillary is closely scaled on the posterior half.

Gillrakers 7+18, longest 2 in eye, the first 5 on the short limb blunt and rough-tubercular, the last 8 on the long arm similar. Scales 61 or 62, about 45 in oblique series along lower portion of side; head 3; depth 3; eye 4.5; snout 4.5; interorbital a little less than eye.

Dorsal 13; anal 6; dorsal spines 1.75 in head; nasal, postocular, preocular, tympanic, and parietal spines present; coronal spine on right side and nuchal spine on right side present; a small humeral spine present; preorbital with one broad spine. Mandible naked; maxillary closely scaled on posterior half.

The only specimens previously known are the type (from San Francisco) and another from Vancouver Island.

87. *Sebastes caurinus* (Richardson).

We have 15 specimens 2 to 5.5 inches long collected by Osgood and Heller at Queen Charlotte Island, July, 1900; one specimen (no. 1820), 10.5 inches long, collected in 1895 in Klemto Harbor; one 11.5 inches long obtained by the *Albatross* at Sitka in 1896; one 9.5 inches long by Luttrell at Sitka; one 20 inches long collected at station 3449, off Washington; 19 specimens collected near Seattle in 1903 by

Mr. J. E. Todd, and 2 by Mr. Chamberlain at Dolomi in 1903. The species has also been recorded by Bean (1882) from Old Sitka and Chacon and (1884) from Mary Island. It was described originally from Sitka.

Interorbital flat; gillrakers 9 + 19, the longest 2 in orbit, the last six on lower limb mere tubercles, the first four on vertical limb short, rough, and somewhat clavate.

Sebastes caurinus, Osgood, North American Fauna No. 21, September 26, 1901, p. 20 (Queen Charlotte Islands).

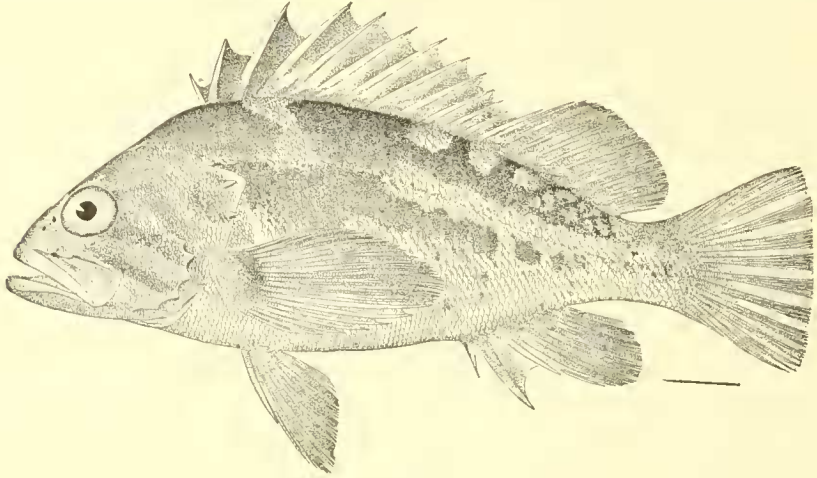


FIG. 37.—*Sebastes caurinus* (Richardson).

88. *Sebastes maliger* (Jordan & Gilbert). *Yellow-backed Rockfish*.

Two specimens (nos. 108 and 109), 6.5 and 7.5 inches long, seined at Union Bay, June 22, and 2 caught on hook at same place June 23; also 2 (nos. 2954 and 2955), 8.5 and 9.5 inches long, taken on

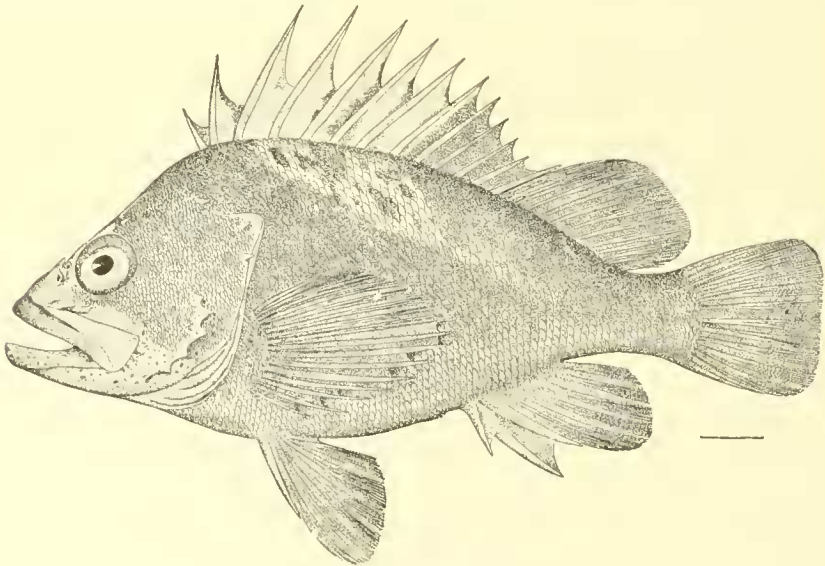


FIG. 38.—*Sebastes maliger* (Jordan & Gilbert).

hook at Sitka, July 28; 5 specimens, 12.5 to 14 inches long, were taken by the *Albatross* at Mary Island; and a single specimen 13 inches long at Klemtoo Harbor in 1895. Two other specimens, one taken by Luttrell at Sitka and one by H. C. Fassett at Klawak. These all agree well with specimens in the National Museum. No. 2954 may be described as follows:

Head 2.9; depth 2.9; eye 4; snout 4.1; maxillary 2; mandible 1.9; interorbital 5.25; dorsal xiii, 12; anal iii, 6; gillrakers 8 + 19, rather stout, longest 2.75 in eye; scales 57, pores 48; longest dorsal spine 1.8 in head; longest dorsal rays 2.1 in head. In other specimens the gillrakers were 10 + 21 or 10 + 19.

Body short, stout, and deep; mouth slightly oblique, lower jaw not projecting, maxillary nearly reaching posterior border of orbit; mandible and maxillary not scaled; nasal, preocular, postocular, tympanic and parietal spines present; nuchal, coronal, and supraocular spines absent; preorbital with 2 broad, low points, not spine-like.

This species is known to range from Monterey to Sitka in rather deep water, being abundant northward. It reaches a length of about 2 feet. It was also recorded from Sitka by Bean (1882) as *Sebastichthys maliger*.

89. *Sebastodes nebulosus* (Ayres).

A small specimen (no. 112), 2.5 inches long, from station 4204, off Fort Rupert. We have also 2 others, 11 and 12 inches long, taken by Mr. H. C. Fassett at Klawak in 1905. Bean (1884) records it from Mary Island. The following measurements are taken from the small example from station 4204:

Head 2.75; depth 3.6; eye 2.9; dorsal xiii, 13; anal iii, 6; scales 45 to 47, about 42 pores; gillrakers long and slender; nasal, preocular, postocular, tympanic, and parietal spines present. The color, however, does not exactly agree with that given for this species. Our specimen in alcohol is clayey white, mottled with large, irregular brown blotches, about 4 along side above lateral line, 2 or 3 immediately below it, and 3 along lower part of side; spinous and soft dorsals similarly mottled.

90. *Sebastodes nigrocinctus* (Ayres). *Black-banded Rockfish*.

Two specimens, 13 and 14 inches long, taken by Mr. H. C. Fassett at Klawak in 1905, and one specimen (no. 2863), 12 inches long, taken by Mr. Chamberlain on hook and line at Naha Bay, Loring, July 7, 1903, where he states that the species is common. This specimen gives the following measurements:

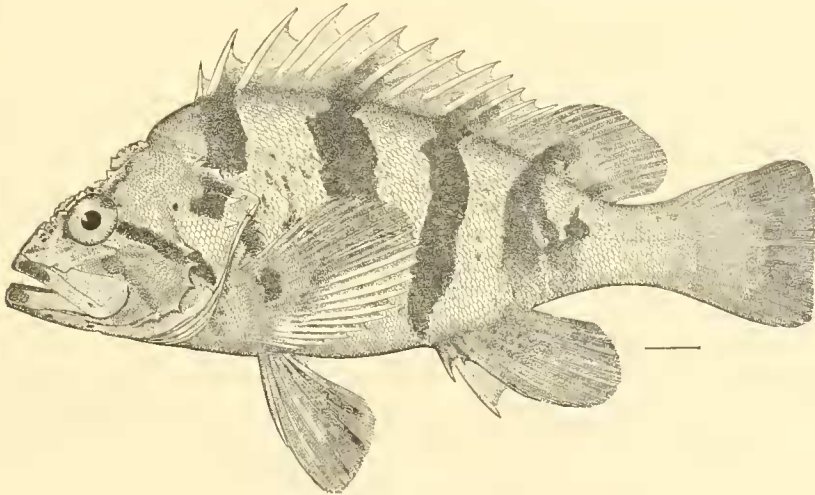


FIG. 39.—*Sebastodes nigrocinctus* (Ayres).

Head 2.65; depth 2.67; eye 4; dorsal xiii, 14; anal iii, 7; scales 52; pores 44; snout 4.5; gillrakers 9 + 21, stiff, rough, clavate, the longest 3.5 in eye, the terminal ones of each arm reduced to tubercles. It differs from typical examples in the following respects: There is a small supraocular spine on the left side; the mandible is pretty well covered with very minute, thin cycloid scales; the nuchal spines coalesce with the parietal.

Color in life: Body blood red; cheek with a black stripe downward from front of eye to lower edge of cheek; another from eye backward and downward to branchiostegals; a large black blotch on upper

part of opercle; a broad black bar from front of dorsal downward to opercle, connecting with black opercular blotch; another and much broader from fifth to seventh dorsal spine nearly vertically downward to belly; another from ninth to twelfth dorsal spine to vent; two others from soft dorsal to soft anal, these fusing below; fins all red, the dorsal and anal encroached upon by the black sidebars; a short black area behind eye; base of pectoral blotched with blackish.

This species reaches a length of 2 feet or more and is known to range from Monterey Bay to Naha Bay. Recorded (1884) by Bean from Mary Island.

Family 31. ANOPIOPOMATIDÆ.

91. *Anoplopoma fimbria* (Pallas). *Black Cod.*

The black cod, coalfish, beshow, or skil, as it is variously called, occurs on our Pacific Coast from Monterey Bay to the Aleutian Islands. It was taken by the *Albatross* at station 2869, in 1888, at Cordova Bay in 1897, and at Loring, Pyramid Harbor, and Taku Harbor in 1900. One specimen from each place is in the collection. Bean, in 1882, records it from Sitka and Wrangell and in 1884 from Massler Harbor. We also have one specimen (no. 02825), 14 inches long, taken with hook and line over the rail off Fort Rupert (1903).

This species is known at Loring and Taku as black cod; at San Francisco it is called candle-fish, and on Puget Sound, horse mackerel; it is sometimes sold in the markets as Spanish mackerel; in the Straits of Fuca it is known as beshow by the Neah Bay Indians. It is found usually in rather deep water and is perhaps most abundant in the Puget Sound region. It is seen oftener in the Seattle markets than in those of any other place. It attains a length of 18 to 20 inches and a weight of 5 pounds.

As a food fish it occupies only a moderate rank, the flesh being rather dry and tasteless. On Puget Sound, however, where it reaches a larger size and is fatter than elsewhere, it is more highly esteemed, particularly by the Indians. It is said to feed on crustaceans, worms, and small fishes. As a game fish it is not without interest, taking the hook readily and making a fair fight. It can be taken with cut bait at depths from 2 to 15 fathoms.

Family 32. HEXAGRAMMIDÆ. The Greenlings.

92. *Pleurogrammus monoptyerygius* (Pallas). *Atka Mackerel; Atka-fish.*

This interesting fish occurs in the North Pacific, chiefly among the Aleutian Islands. It was described originally by Pallas in 1810 from specimens obtained at Unalaska. Its center of abundance

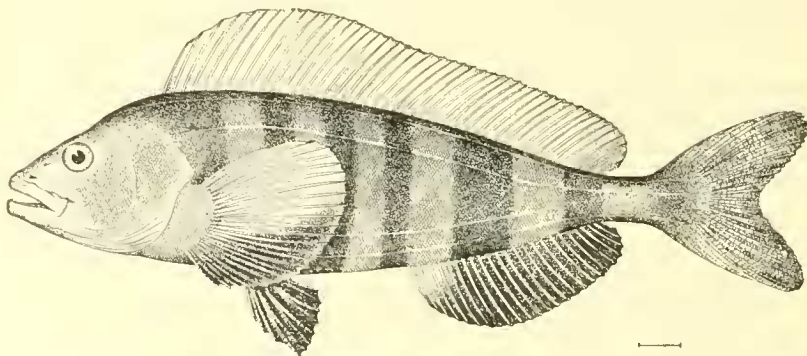


FIG. 40.—*Pleurogrammus monoptyerygius* (Pallas).

seems to be in the passages about the islands of Atka and Attu. It is known also from about the Pribilof Islands and eastward through the Aleutian Chain to Belkofski and the Shumagins. Stejneger found it at Saranskaya, Bering Island. Bean (1882) has recorded it from Unalaska, Chernofski, and Attu; Turner (1886) found it at Unalaska, Anlia Pass, Captains Harbor, Atka, and Attu; Gilbert (1895) lists it from Unalaska; and Evermann found it in abundance during the last week of May (1892) at Atka and Attu.

The best account of the habits of this fish is that given by Turner. It is so interesting and instructive that its republication, with some slight modification, is justified. Turner says: ^a

When I arrived at Unalaska in 1878 I heard much talk about the "mackerel." During the summer of that year I had an opportunity of conversing with those who frequented the western islands of the Chain, where these fish were said to abound. Several persons referred to these fish as "Spanish mackerel," others called them "horse mackerel" and "Alaskan mackerel," and under several scientific names. They were served at the table on several occasions, and all who ate of them highly praised their good qualities and spoke of their great resemblance in taste to the Atlantic mackerel. It was not until in May, 1879, that I had an opportunity of visiting the locality where they were said to be abundant.

During the summer of 1879 I was at Atka Island, and soon made inquiry concerning the fish. I was told that they make their appearance in the narrow pass between the islands of Atka and Amlia about the 1st of June, and that the fish invariably come from the Pacific Ocean, which here mingles its waters with that of Bering Sea.

The first arrivals of fish are the males of largest size and beauty of color. They arrive a few days before and await the arrival of the females and immature males.

By the 18th of June the fish have come in countless thousands. They arrange themselves with their heads toward the tide currents which rush violently through the pass. The flood tide sets in from the Pacific, while the ebb flows toward the Pacific, or, in other words, a southerly directed current for the ebb and a northerly directed current for the flood tide. The pass is very rocky, with numerous sunken rocks in the middle and on the eastern side. The western side of the pass has the deepest water and is 3 fathoms deep in the channel. On the north side of the pass numerous ledges of rocks, hidden rocks, kelp patches, and small islets of but few feet above the water's edge are to be found. It would be very difficult navigation for a vessel of over 20 tons to go through there with safety. The natives of the present day cross pretty well to the north side of the pass until they get under Amlia Island and then run near the shore of Amlia with their small bidari or open boats.

Among the seaweeds or kelp patches on a cloudy day of clear lower atmosphere the fish may be seen in the following order:

The young males and immature females form a stratum of three or four fish deep and several feet wide; beneath these a second stratum of older males and females, whose roe is not yet developed, and will later, in the spawning season, take their place with those in the third stratum, which is composed of vigorous males and females. The latter are the most abundant. The female deposits her eggs on the kelp, though much of it must doubtless be lost by the swift currents washing it off. These males and females remain in this place until the spawning season is over, generally by the 20th of July, after which they gradually disperse and quickly find their way back to the Pacific. Many times I have seen huge halibut lying like large flagstones beneath the lower stratum of fish, waiting for one to come within reach. Without moving a great distance I could see over a dozen halibut at a time. I estimated the weight of some of the larger ones to be not less than 350 pounds.

The natives of Atka repair to this place and have several turf houses of small size built there. It is also a garden spot where a few vegetables, such as radishes, turnips, and a few potatoes, are planted. To attend to their gardens and to be near the fishing grounds the Aleuts of many places have built these summer villages. Here assemble all the old men not able to hunt and the children and women of the hunters gone off on a summer's cruise for sea otters. These lay in a store of dried and salted fish for their sons and friends.

The natives obtain the greater number of the fish in the following manner: Each man has a two-holed bidarka (canoe). In it a small boy sits in the front hole while the old man sits in the rear hole. The man uses a pole of several feet in length (generally not less than 12 feet long), on which is firmly secured a hook of iron, having a flattened point with a sharp edge and a notch filed on the inner side to act as a barb. When the canoe arrives at the place the boy is ordered to seize hold of a strong frond of the giant kelp, which streams out sometimes for over a hundred feet, and among which the fish are most abundant. After coming thus to anchor the man carefully thrusts the pole into the water, and if the fish are plentiful he will soon feel them surging against it. He now begins to jerk it up and down in the water to gig any fish that may come along. In a few seconds he brings one out. The work now becomes exciting, for scarcely has the pole been again thrust in the water than it is jerked into another fish. A man may thus, in a couple of hours, take 200 to 300 fish. After the canoe is loaded it is taken to the shore, where the women slit open the back of the fish, take off the head, clean out the entrails, and with a cut on each side the backbone is removed to the tail. The two sides of the fish are left hanging together by the tail. This is to enable the fish to be hung over a pole to dry. Often the men bring the fish directly to the principal village and clean them there, though this is done more often when the fish are to be salted. At the season between June 25 and July 25 the fish are extremely fat from the abundance of a small crustacean, which has previously come in myriads to the same places as these fish. The fish which are to be dried are usually taken about the 1st of August, as they are so fat before that time that I have seen the oil drip from the drying fish. They also, from the presence of the oil, become rancid in a short time and are said not to keep so well.

At Attu Island also I had an excellent opportunity for studying the habits of these fish. At this place the fish are most abundant at the entrance to Chichagof Harbor, on the northeast shoulder of the

^aContributions to the Natural History of Alaska, by L. M. Turner, p. 96, Washington, 1886.

island. Several islets and many reefs are disposed nearly across the entrance to the harbor. Between these the tide currents run with great velocity. An abundance of large kelp patches is found in the vicinity. The fish arrive at Attu, from the southwestward, about the 24th of April, though this date varies according to the openness of the season. It is rarely later than the 1st of May. The fish come at first in a straggling manner, and their first appearance is made known by their being caught on hooks while the men are fishing for other kinds. The first comers are usually nearly adult males. They are not fat on arrival, but soon become so from the abundance of small crustaceans that fairly swarm among the patches of seaweed by the 10th of May, and at which time the fish are tolerably numerous. By the 10th of June thousands of these fish can be seen in the shallow water (about $1\frac{1}{2}$ to 8 fathoms deep) below. The natives here take considerable quantities of these fish and dry them for use at an early date. They rarely salt them for the reason that, they state, this fish makes the consumer thirsty. When they go to catch them they visit the various localities known to be the haunts of these fish, and by looking beneath the mass of kelp fronds can see them if present; if not, the fish are off in the open water. They then watch every floating piece of detached seaweed. It is constantly turning round and round, like in an eddy of water. The fish are playing with it, and there will be found an abundance. The gaff is quickly thrust into the water, and one is soon struck and brought out.

I here had opportunity to come to the conclusion that these fish will bite readily at the hook. I saw them jump and struggle to get at the gaff and could feel them strike against it while it was in the water, and at times it was impossible to hold it in position, as the mass of moving fish carried it along with them.

Any kind of fresh fish may be used as bait on a small cod hook for these fish. A piece of scarlet flannel tied above the hook is good to attract the fish, as they will then bite voraciously.

With a hook a person can catch the fish as fast as put into the water. With the use of several hooks on one line, several fish may be taken at once. With the gaff the fish are taken in great quantities, equal to all demands. The run lasts at Attu until July 25, after which the fish are spent and slowly disappear from the waters.

These fish were not known at Attu previous to 1875. They came unexpectedly and were caught on hooks set for other fish. Since that time the people have had an abundance of them. From my own observations I am led to assert that 500 barrels of 200 pounds each can be procured at Attu in the season from June 1 to July 31. At the entrance to Chichagof Harbor is the only known locality at Attu where these fish resort. The natives assert that the coming of these fish was coincident with the disappearance of the sea lion (*Eumetopias shelleri*), and those natives maintain that the fish drove the sea lions off—just opposite to my own conclusions, for I think the fish come to those places where they will be least persecuted by the sea lions.

These fish are also reported to be abundant at Kiska Island, between the islands of Atka and Adak; also between Unalga and Unalaska, and also in the passes between some of the Shumagin Islands. I saw a few individuals in Captains Harbor, Unalaska Island, in the early part of July, 1881. This is the first instance of their occurrence in that locality. They were small in size and of the size which constitutes the upper stratum as spoken of in regard to the disposition of the fish on the spawning grounds of Amlia Pass.

This fish could be easily taken in great quantities, especially at Amlia Pass and Attu. Some writers of Alaskan affairs have mentioned exorbitant prices paid for a barrel of salted fish of this kind. They can be prepared at a cost of \$2 per barrel for the fish at either Attu or Amlia. The cost of the barrel and salt, of course, is to be added. Only the necessary sheds for protecting the barrels from the weather would have to be erected. Native help could be procured at a cost of \$1 per day for a man and 50 to 75 cents per day for the women, who can clean the fish as expertly as the men.

This species appeared at Atka about May 15, 1892, the large ones coming first. Natives stated that the fish are always found in the kelp and that they disappear late in September and early in October. They sometimes come into the harbor even in front of the village. Small ones, half the size of the largest, appear in July. Sea lions killed at various times throughout the winter frequently have their stomachs filled with Atka mackerel; hence it is believed these fish remain about the islands all the year. Captain Lennon found Atka mackerel in stomachs of fur seals taken in Bering Sea in July. They evidently spawn in June. Numerous females examined May 28 were found with nearly ripe roe, the eggs being about the size of no. 6 shot.

There is no other fish of the Aleutian Islands, whether in salt water or fresh, that is so interesting to the angler as the Atka mackerel. In the first place it is a most beautiful fish, with its alternating broad bands of glossy black and chrome yellow and its trim form; and its game qualities are of no mean order. It takes the hook readily and makes a good fight. The usual method of taking it is by "jigging." On May 28, 1892, the senior author had excellent sport catching these fish near the mouth of the bay at Attu. Three hooks tied together in a bunch were used, and just above them was tied a piece of white muslin. The line was weighted so that the hooks would descend quickly. When they had reached the bottom, or near it, they would be jerked up and down and the fish, striking at the muslin, would be hooked or would catch the hook in their mouths. The lines would be let down through the kelp in water 15 to 25 feet deep.

The fish were in schools and it was easy to get great numbers; in fact, one would be kept busy hauling in the fish and taking them off the hook. Usually they were near the bottom when the fishing began, but they soon became greatly excited and would come near the surface, where they could be seen swimming about as if greatly disturbed and evidently searching for the piece of white muslin which had attracted their attention. When first hooked they would come up very readily; in fact, they seemed to swim upward until near the surface when they would become alarmed and dart back and forth in their efforts to free themselves. Then the sport was very exciting.

The Atka mackerel reaches a length of 18 inches and a weight of 3 or 4 pounds. The average weight of 585 fish was about $2\frac{1}{2}$ pounds and the maximum $3\frac{1}{2}$ pounds.

Commercially this species has never come into the prominence which its excellence as a food fish justifies. As a fresh fish it is delicious either baked or fried. It takes salt well, and in that condition is a very palatable and nutritious article of food. There seems to be no good reason why an important fishery should not be established.

93. *Hexagrammos decagrammus* (Pallas). *Rock Trout*.

Four specimens 3 to 8 inches long, collected at Sucia Island, Gulf of Georgia, May 6, 1894. No. 2230-2233 and 2235, each about 14 inches long, collected by the *Albatross* in Redfish Bay, Baranof Island, September 6, 1897, showing the two distinct color patterns, and no. 1729 (1763), a specimen 13 inches long, collected at Sitka by Luttrell.

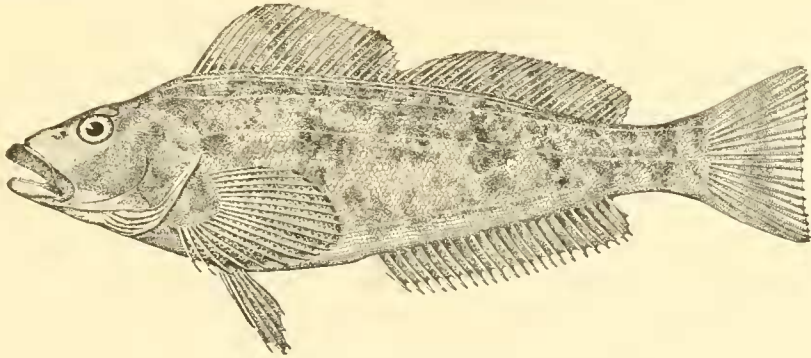


FIG. 41.—*Hexagrammos decagrammus* (Pallas).

Recorded by Bean (1882) from Sitka; Old Sitka; Chatham Strait; and Unalaska, and in 1884 from Tolstoi Bay. Nelson (1887), Unalaska.

This species, also called *boregat* and *bodieron* by the Russians, ranges from Point Conception to Kodiak Island. It is most abundant southward and is common at San Francisco. It attains a length of 18 inches and is a good food fish.

94. *Hexagrammos octogrammus* (Pallas). *Alaska Greenling*.

This species has been obtained by the *Albatros* at Uganuk Bay, Kodiak Island (1897), Attu Island, Sucia Island, and Akutan Bay (1894), Tareinski Harbor, and Unalaska, Litnik Bay (1900). Bean has recorded it (1882) as *H. ordinatus* from Old Sitka, from Popoff Island (Shnmagin Group), and Iliuliuk and Chernofski; and Nelson (1887) records it from Unalaska. It has been recorded also from Petropaulski, from Robben Island, and Iturup Island. In 1903 the *Albatross* seined an example (no. 2971) 9.5 inches long at Uyak Bay, another (no. 2976) 10 inches long at Snug Harbor, and one 10.25 inches long at Union Bay. An example (no. 151) 4.25 inches long from Tareinski Harbor shows plainly the black humeral spot and 7 black transverse bars on anal fin; supraoccipital flap very small, about equal to pupil; a few white spots on side.

The center of abundance of this species seems to be among the Aleutian Islands, and its range extends westward to Petropavlski and Robben Island and south to Sitka. The species attains a length of a foot or more and is a good pan fish.

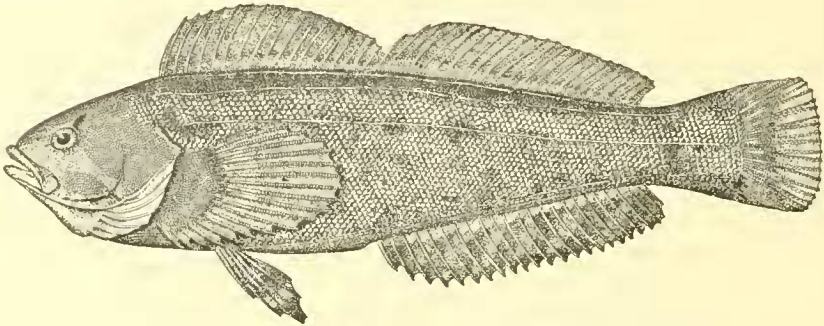


FIG. 42.—*Hexagrammos octogrammus* (Pallas).

95. *Hexagrammos stelleri* Tilesius. *Greenling*.

This species seems to be rather common all along the coast of Alaska, specimens having been taken with hook or seine at Marrowstone Point; Otter Bay, Sucia Island; Alert Bay, Union Bay, Kilisut Harbor, Metlakahtla, Cleveland Passage, Loring, Skagway, Sitka, Killisnoo, and Litnik Bay.

The specimens taken were chiefly small ones, the smallest being 3 inches long—one each from Litnik Bay and Ankau River, the largest 13.5 inches long from Litnik Bay; another specimen, 13.25 inches long, is from Marrowstone Point.

The specimen from Marrowstone Point had in life back and side olivaceous with paler greenish spots; side with about 8 darker vertical bars, these ill defined; head greenish olivaceous; belly and under parts

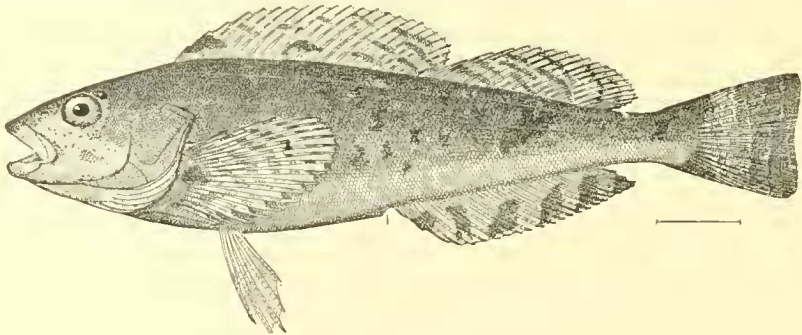


FIG. 43.—*Hexagrammos stelleri* Tilesius.

yellowish, dusted with dusky greenish; dorsal olivaceous, with small yellowish spots more or less coalescing and large blackish areas near base; caudal orange red; anal with 6 oblique lemon bars, separating broader darker bars, edge of fin bluish reddish; pectoral reddish yellow, barred with darker; ventral pale yellowish with reddish tinge. The young are much blotched and mottled with bars on the side. These markings tend to disappear in the larger examples, leaving the color in alcohol uniform brownish.

The species has also been recorded as *Hexagrammus asper* (Nelson 1887) from St. Michael. Bean (1882) records it from Sitka; Port Mulgrave, Yakutat Bay; Refuge Cove, Cook Inlet; St. Paul, Kodiak; Unalaska, Atka, St. Michael, and Port Clarence. Gilbert (1895), stations 3228, 3229, 3231 to 3234, 3239 to 3241, 3243, and 3245 in Bristol Bay.

The species ranges from Kamchatka and Unalaska to San Francisco, being perhaps most abundant in Puget Sound. It reaches a length of a foot and is of value as a food fish.

96. *Hexagrammos superciliosus* (Pallas). *Red Rock Trout*.

Three specimens, 11 to 14.63 inches long, obtained by Mr. Rutter at Karluk, where another 18.5 inches long, was collected in 1893 by the *Albatross*. We have also examined Nelson's (1887) specimens from Kyska; Akutan Bay; Redfish Bay, and Unalaska; Bean's from Sitka; Port Mulgrave, Yakutat Bay; Amchitka; St. Paul, Kodiak Island; Chernofski, and Attu; and Gilbert's (1895) from Makushin and Chernofski Bays, Unalaska Island and stations 3244 and 3245 in Bristol Bay.

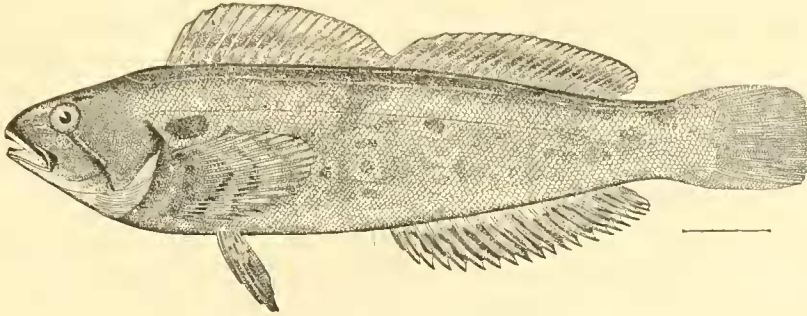


FIG. 44.—*Hexagrammos superciliosus* (Pallas).

We fail to find any differences in the supraocular flap of this species and that of *octogrammus*. Dr. Gilbert says it may be distinguished from *octogrammus* by the larger flap, smoother scales, and deeper notch in the dorsal. The deeper notch in the dorsal and the complete fourth lateral line in *superciliosus* are the only marked differences we can find in our specimens. The specimen from Redfish Bay is very highly colored with large white spots and bars, the spots being on base of pectoral and lower part of body, the bars running irregularly over body and head.

This species ranges from Bering Sea to Monterey Bay but is most abundant northward. It grows to a length of nearly 2 feet and is a palatable food fish.

97. *Hexagrammos lagocephalus* (Pallas). (Pl. xv, fig. 2.)

The home of this species is in the western parts of Bering Sea. It is known to occur about Bering, Robben, and Iturup islands. The only specimen known from Alaskan waters was obtained at Attu in 1894 by the *Albatross*. It is no. 1665, U. S. National Museum, and is 19 inches long.

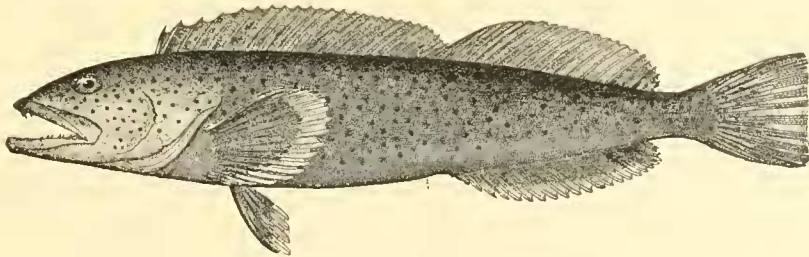


FIG. 45.—*Ophiodon elongatus* Girard.

98. *Ophiodon elongatus* Girard. *Cultus Cod*.

Recorded from Sitka by Bean in 1882.

Three small examples, 4 to 5 inches long, from Port Townsend; one (no. 02832), 12.5 inches long, from Marrowstone Point. The species was also seen at Quarantine Station, Union Bay; Port Alexander; Sitkoh Bay; and Loring. It was taken both in the seine and with hook and line. We also have a specimen 12 inches long taken by the *Albatross* at Port Etches, Prince William Sound, 1897.

The cultus cod occurs on our west coast from Santa Barbara northward to Prince William Sound, and is abundant throughout most of its range. It reaches a length of nearly 4 feet and a weight of 30 to 40

pounds. Although not a high-grade food fish, its size and abundance make it a species of considerable commercial importance. As a game fish also it is of interest, taking the hook freely and affording much sport to the angler.

99. *Zaniolepis latipinnis* Girard.

This monotypic species is abundant in rather deep water from San Francisco northward at least as far as Puget Sound. We have 31 specimens 5 to 7.5 inches long collected by J. P. Todd near Seattle, 1903. It reaches a length of a foot and is a slender fish of dry, firm substance and singular form, little valued as food.

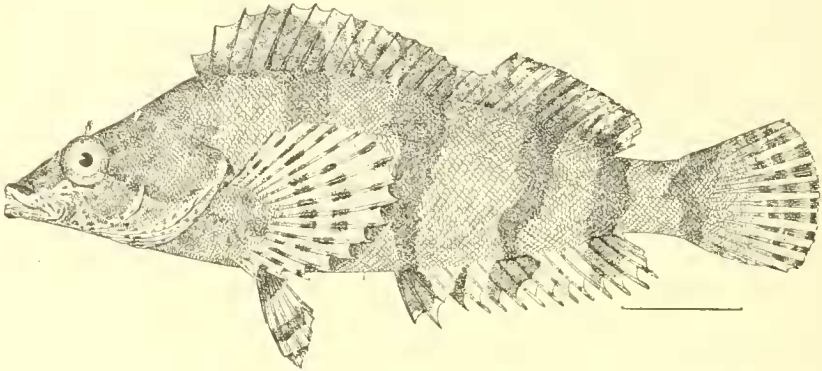


FIG. 46.—*Oxylebius pictus* Gill.

100. *Oxylebius pictus* Gill.

This species occurs on rocky shores from Monterey Bay northward at least to Puget Sound. It is a small fish, seldom exceeding 10 inches in length. It dwells in the kelp, where it is usually abundant, though it is rare in collections. It is not of much food value. We have one specimen 8 inches long, taken by the *Albatross* at Seattle, March, 1892.

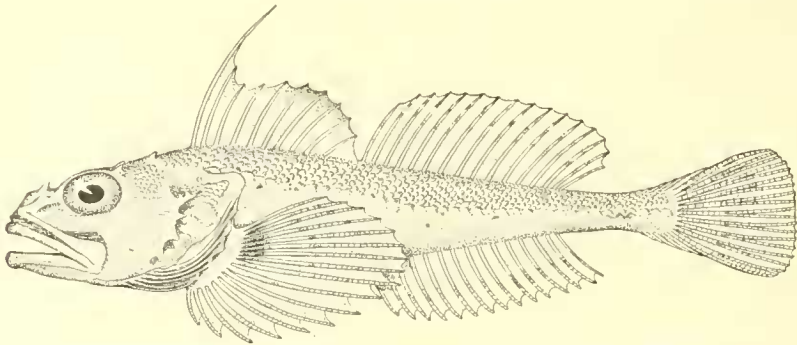


FIG. 47.—*Chitonotus pugetensis* (Steindachner).

Family 33. COTTIDÆ. The Sculpins.

101. *Chitonotus pugetensis* (Steindachner).

Fourteen specimens, 2.5 to 4.5 inches long, collected by J. P. Todd, near Seattle, in 1903.

A conspicuous nasal tentacle about as long as pupil. Anal dark in the males. The species reaches a length of 6 inches and occurs from San Francisco to Puget Sound in moderate depths.

102. *Tarandichthys filamentosus* (Gilbert).

One specimen 2.5 inches long dredged at station 4193, off St. Mary Mission. Not before recorded north of southern California.

Eye rather larger than given in current descriptions, being scarcely 3 in head; filaments on preopercle not evident.

103. *Tarandichthys tenuis* (Gilbert).

Two examples, 2 and 2.5 inches long, from station 4204, near Fort Rupert, and two, 2.1 and 3.75 inches long, from station 4193, in the Gulf of Georgia. Not previously recorded from north of San Francisco.

In our specimens the maxillary reaches anterior edge of pupil; gillrakers small and tubercular; peritoneum dusky; 2 parietal spines; first 2 or 3 scales of lateral line enlarged, the first with a distinct spine; pearly patches on base of pectoral.

The larger specimen from Gulf of Georgia had its stomach filled with shrimps and its abdominal cavity full of thread-like worms.

104. *Icelinus burchami* Evermann & Goldsborough, new species.

Head 2.8 in length; depth 4.6; eye 3.25 in head; snout 4.5 in head; maxillary 2.2; mandible 2; interorbital 2.25 in eye; dorsal ix-16; anal 14; pectoral 18; lateral line 38.

Body comparatively slender, tapering rapidly backward to caudal fin; head rather large; mouth moderate, low, terminal, nearly horizontal, the lower jaw slightly included; maxillary rather short, reaching posterior edge of eye; eye moderate, somewhat ovate; nasal spines short and obscure; nasal

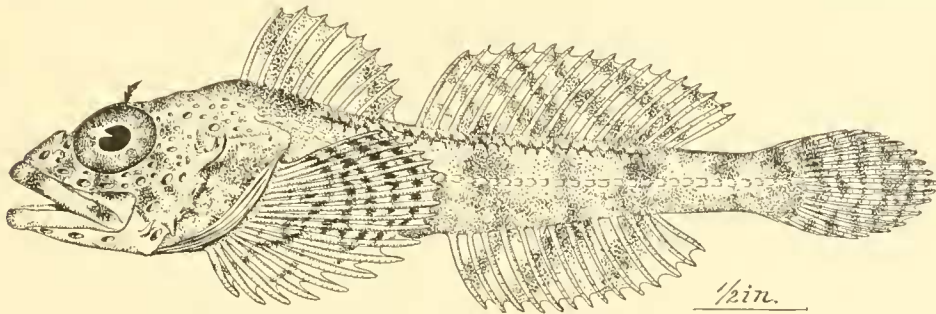


FIG. 48.—*Icelinus burchami* Evermann & Goldsborough, new species. Type.

tentacle obsolete; supraorbital with a flat, black, bifid cirrus posteriorly, its length about equaling the pupil; a slender black occipital filament; a small white filament near tip of maxillary; occipital ridges not prominent, the included space flat, not pit-like; interorbital space flat, the median ridge very faint; preopercular spine rather strong, its length about 1.5 in orbit, three sharp spines on its upper edge directed upward, a short, sharp spine at the tip; under edge of preopercle with 3 short, stout, triangular spines, the first and second directed backward and slightly downward, the third, which is longest and sharpest, directed downward and forward; opercular spine flat and obscure; a double row of scales or plates along upper part of side, beginning under about the fifth dorsal spine and ceasing under the last dorsal ray but one, the row double throughout its entire length except posteriorly, where the lower row ceases three scales in advance of the upper row; upper edge of caudal peduncle, narrow space between the double row of scales, just described, and the dorsal fin, and broad space between it and the lateral line, naked; entire body below lateral line naked; no postpectoral plates. Fins well developed; spinous dorsal with the spines slightly filamentous, the longest about 2.75 in head; longest dorsal ray 3 in head; anal similar to soft dorsal; caudal somewhat rounded, its length 1.8 in head; pectoral broad, reaching past front of anal; ventrals very short and inconspicuous, their length scarcely exceeding diameter of pupil.

Color in alcohol, yellowish brown; body and head blotched and mottled with small whitish spots and darkish irregular blotches; dorsal, anal, and caudal fins dark, blotched with white; pectoral similar, the lower rays whitish at tip, the interradial membranes darker.

This species is related to *I. borealis*, from which it differs chiefly in the larger eye, the shorter snout, the weaker nasal spines, the shorter preopercular spines, and the less complete series of scales along the base of the dorsal. Type, no. 57822 U. S. National Museum (field no. 99), a specimen 4 inches long from Albatross station 4228 in 41 to 131 fathoms, off Loring, Alaska, July 7, 1903. Cotypes: No. 5229, Bureau of Fisheries; no. 20010 Museum Stanford University; no. 57825, U. S. National Museum, and no. 6117, Field Museum, all from the same place; and no. 33003, Academy Natural Sciences, Philadelphia, from Behm Canal, near Loring, July 8, 1903.

This interesting species is named for Mr. James S. Burcham, a young naturalist of great promise, who lost his life at Lake McDonald, November 12, 1905, while in the employ of the Bureau of Fisheries.

105. *Icelinus borealis* Gilbert.

This species is common and widely distributed. We have examined specimens from the following localities: Albatross stations no. 4205, 4209, 4212, 4213, 4217, and 4218 (all in Admiralty Inlet), 4276 (Alitak Bay), 4285 (Chignik Bay), 2428 (Behm Canal), 3597 (off coast of Washington), Seattle, and Loring. It had been previously recorded by Gilbert (1895) from various Albatross stations north and

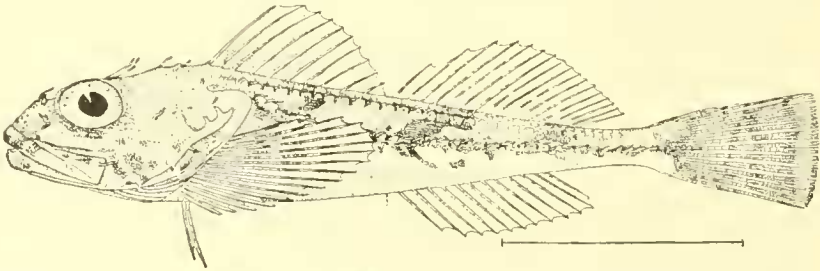


FIG. 49.—*Icelinus borealis* Gilbert.

south of the Aleutian Islands and in Bristol Bay. The known range is, therefore, from Bristol Bay and the Aleutian Islands to Puget Sound.

Our specimens are 1.6 to 3.25 inches long. The length (2.5 feet) given in *Fishes of North and Middle America* is evidently an error. We are unable to distinguish *I. strabo* Starks from this species.

106. *Astrollytes fenestralis* (Jordan & Gilbert).

The collection contains one specimen 3 inches long, seined at Metlakahtla, 6 smaller specimens seined at Admiralty Head, Whidby Island, and 5 specimens from Sucia Island; also 13 specimens collected by Mr. Rutter on the beach at Karluk and 13 by Mr. Chamberlain at Loring. Recorded from Unalaska and Sanborn Harbor, Shumagin Islands by Bean (1882) as *Artedius notospilotus*, and from the Shumagin Islands by Jordan & Gilbert (1899).

Head 2.9 in length; depth 4.6; eye 4.3 in head; dorsal ix-17; anal xii; lateral line 36; maxillary extending to posterior border of pupil.

This species reaches a length of about 5 inches. Its known range extends from Puget Sound to Unalaska.

107. *Stelgidinotus latifrons* Gilbert & Thompson.

One specimen 1.13 inches long, from station 4213, near Admiralty Head.

Head 3.1 in body; depth 4.9; eye 3.5 in head; snout 4; maxillary 2.5; interorbital equal to eye; dorsal ix, 17; anal 14; ventral i, 3; pectoral 15; branchiostegals 6; pores 35.

Body rather elongate, not much compressed, gradually tapering from head to the rather slender caudal peduncle, the least depth of which is about 3 in head.

Head rather small, lateral profile of snout somewhat blunt and rounded, upper profile somewhat rounded; interorbital rather broad and somewhat concave, nasal spines prominent, a round filament

at the base of each, the sheath of the premaxillary pedicel rising between them as a stout, blunt spine; occiput rounded, without spines or cirri, a cirrus or two near tip of opercle; preopercular spines 4, the upper curved and hooked upward, rather blunt, but strong, and covered with skin, the others minute, all extending as mucronate points from a broad base, and all apparently pointing upward; a series of large pores under eye and along lower edge of preopercle and lower jaw; mouth small, somewhat oblique, the tip of premaxillary about on a line with lower margin of orbit; maxillary reaching to anterior margin of pupil, lower jaw included; teeth minute on jaws and vomer; gill-membranes forming a free fold across isthmus; origin of spinous dorsal above gill-cleft, its base 1.33 in head, its upper margin parallel with back; base of soft dorsal 2.9 in body, spinous and soft dorsal connected by membrane; pectoral 2.66 in body, quite large, pointed, reaching a considerable distance beyond origin of anal; ventral 1.66 in head, nearly reaching vent; length of caudal about equal to head; anal quite long, its base about equal to length of head; caudal apparently truncate, its origin nearly vertical from that of soft dorsal; vent considerably anterior to middle of body.

Head naked, the rest of the body covered with small papillae; enlarged scales along lateral line, especially in front, pores somewhat conspicuous for the whole length; plates of lateral line not keeled, but each bearing several small spines on posterior margin; a series of indistinct transverse wrinkles behind axil.

Color mottled olivaceous on sides, the mottlings indistinct, so disposed as to form a series of about 5 saddle-like markings across the back about equally distributed, the light areas between them nearly circular; top of head dusky; fins plain.

Stelgidonotus latifrons Gilbert & Thompson, Proc. U. S. Nat. Mus., vol. XXVIII, 1905, p. 977, near Bremerton, Wash.

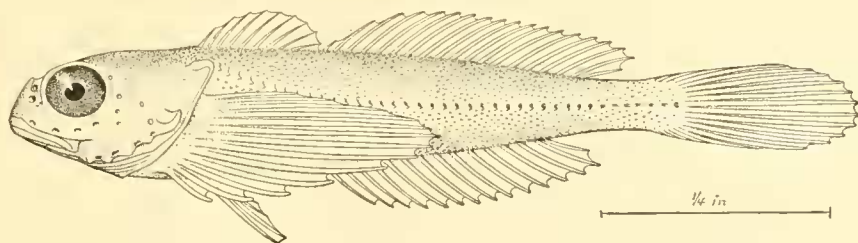


FIG. 50.—*Stelgidonotus latifrons* Gilbert & Thompson. Type.

108. *Artediellus pacificus* Gilbert.

Our collections contain specimens from the following localities: Albatross station 4285 (Chignik Bay), 4268 (Afognak Bay), 4276, 4277, 4278, and 4279 (all in Alitak Bay); and 3653 (Bering Sea). The species was originally described from station 3216, south of Sannak Island, and is recorded by Gilbert from many stations in Bristol Bay.

A female 2.5 inches long, from station 4279, August 6, contained 105 nearly ripe eggs, measuring about 18 to the inch. Of the 15 specimens from Alitak Bay, 2 are males which exhibit a markedly fuller development of the dorsal fins than the others. A small thread-worm was found in the abdominal cavity of one specimen.

109. *Rastrinus scutigera* (Bean).

Originally described by Bean (1891) as *Icelus scutigera* from Albatross station 2853, off Trinity Island. Recorded by Gilbert (1895), as *Icelus scutigera*, from station 3339 south of the Alaskan Peninsula. Not obtained by us.

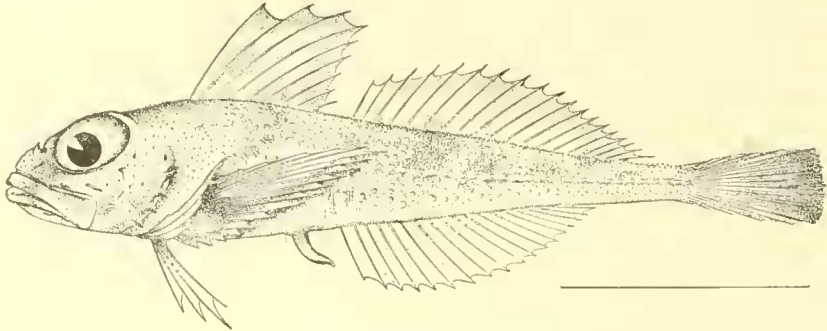


FIG. 51.—*Rastrinus scutigera* (Bean).

110. *Icelus bicornis* (Reinhardt).

Two specimens from station 4281, one from 4285, one from 4286 (all in Chignik Bay), and one from 4278 (Alitak Bay). These range from 1.75 to 3.2 inches long. Also recorded from many stations in Bristol Bay (Gilbert 1895).

This species is easily distinguished by the 2 pairs of spines on occiput, but the specimens we have vary as to the number of dorsal spines, there being 8 or 9, and the rays vary from 17 to 20.

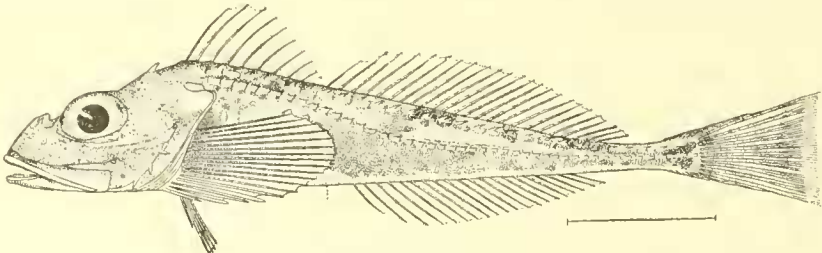


FIG. 52.—*Icelus spiniger* Gilbert.

111. *Icelus spiniger* Gilbert.

One specimen 3.25 inches long, dredged at station 4227 in Behm Canal, near Loring; 3 specimens 2.4 inches long from station 4281, in Chignik Bay; 2 specimens 2.6 inches long from station 4273 in Alitak Bay; 2 specimens 1.75 and 2.4 inches long from station 4283, in Chignik Bay; 1 specimen from 4289, 3 from 4291, 6 from 4292, 2 from 4293, and 6 from 4295, all in Shelikof Strait; these vary in length from 2 to 3.25 inches.

Originally described by Gilbert (1895) from stations 3216, 3223 to 3226, 3257, 3258, 3267, 3278 to 3280, 3292, 3302, 3311, 3331 and 3336, in the vicinity of Unalaska Island and in Bristol Bay.

112. *Icelus euryops* Bean.

Originally recorded by Bean (1891) from station 2853, off Trinity Islands, where 3 specimens were secured. Not taken since that time.

113. *Icelus vicinalis* Gilbert.

Originally described by Gilbert (1895) from stations 3324, 3330 to 3332 in Bristol Bay (1890). Not taken since.

114. *Icelus canaliculatus* Gilbert.

Originally described by Gilbert (1895) from station 3329 north of Unalaska (1890). No other specimens have been taken.

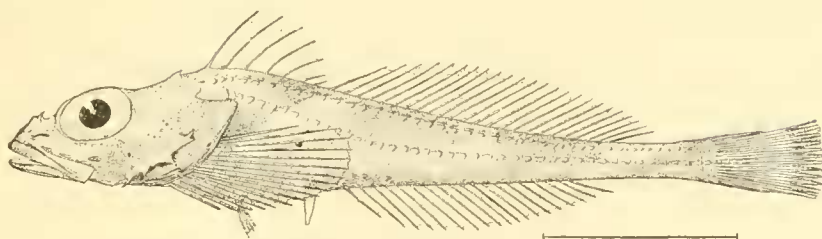


FIG. 53.—*Icelus canaliculatus* Gilbert.

115. *Radulinus asprellus* Gilbert.

Twenty-one specimens, varying from 0.75 to 5 inches, are in the collection, representing the following localities: Station 4221, mouth of Hood Canal; station 4219, Admiralty Inlet; station 4204, off Fort

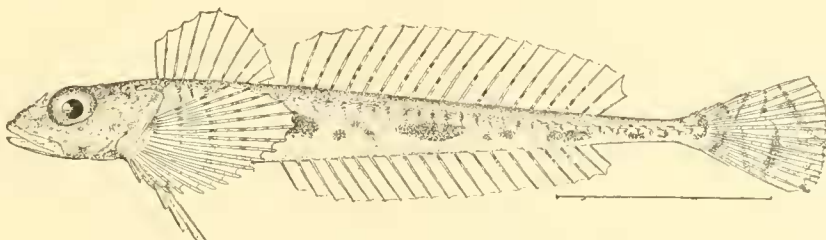


FIG. 54.—*Radulinus asprellus* Gilbert.

Rupert, British Columbia; station 4191, in outer harbor at Nanaimo, British Columbia; Kasaa Bay; station 4226, Behm Canal, near Loring; station 4234, in Yes Bay; and near Seattle by J. P. Todd.

In the specimen from station 4226 the snout equals eye, and is 3.1 in head; maxillary 2.66; mandible 2.1; peritoneum silvery; length of caudal fin 1.45 in head. These measurements are not given in current descriptions.

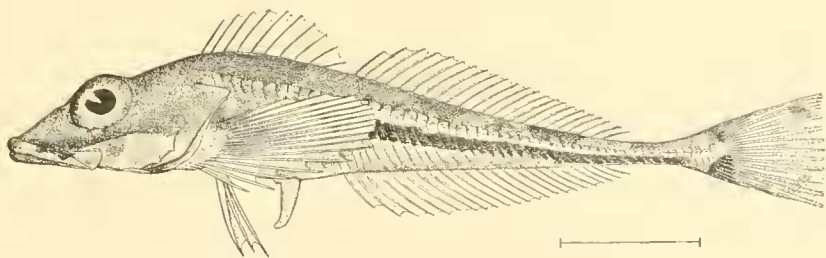


FIG. 55.—*Triglops beani* Gilbert.

116. *Triglops beani* Gilbert.

The collection contains specimens from the following localities: Albatross stations 4205, 4211, 4212, and 4213 (all in Admiralty Inlet), 4248 (Eastern Passage), 4268 and 4269 (Afognak Bay), 4242 (Karta

Bay, 4243 (Kasaan Bay), and from Belun Canal near Loring. The species had been previously recorded from Wrangell Straits (Bean 1884, as *T. pingelli*), Bristol Bay, at numerous Albatross stations (Gilbert 1895), and Bering Sea at Albatross stations 3598 and 3599 (Gilbert 1895).

The specimens obtained during the recent investigations were from depths varying from 14 to 71 fathoms. The males have a dark stripe on side just above anal fin, extending posteriorly from about first third of fin and uniting with the other median stripe at about fifth or sixth ray from last. Anal papilla in male well developed; peritoneum white, liver large, several large pyloric caeca, females not smaller than males.

This sculpin reaches a length of 4 to 8 inches and is of wide distribution, its known range extending from Puget Sound to Bering Sea and to Robben Island.

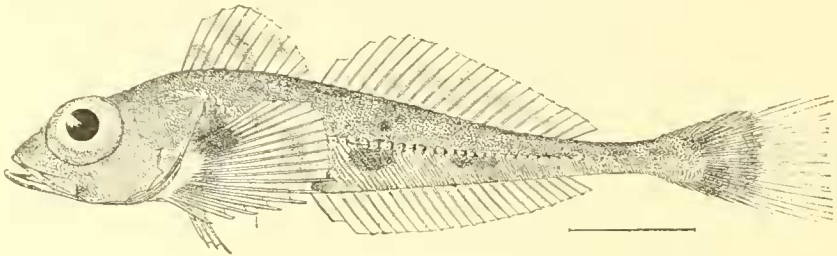


FIG. 56.—*Triglops scepticus* Gilbert.

117. *Triglops scepticus* Gilbert.

A single female example 5.75 inches long dredged at station 4291, in 65 to 48 fathoms, in Shelikof Strait. The interorbital space is more narrow than stated in current descriptions, being contained 3.5 instead of 1.5 times in the eye. About 7 of the lower rays of the pectoral are enlarged and exerted.

Originally described by Gilbert (1895) from stations 3215, 3222 to 3225, 3309, and 3339, south of Sannak and north of Unalaska Island.

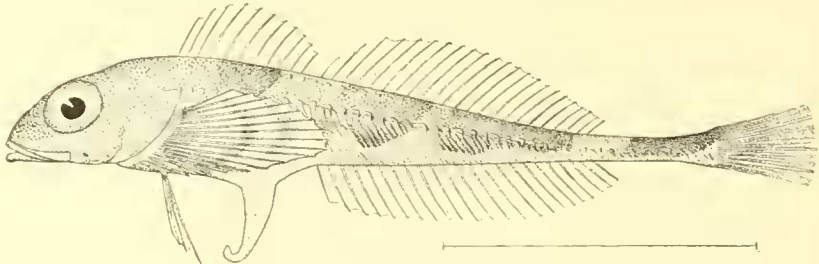


FIG. 57.—*Sternias xenostethus* (Gilbert).

118. *Sternias xenostethus* (Gilbert).

We have two specimens, 2.5 and 4.25 inches long, of this rare species, secured by the *Albatross* at station 3599, in Bering Sea. Only the type, a specimen 1.5 inches long, has heretofore been known. This was described by Gilbert (1895) from Albatross station 3220, north of Unalaska Island.

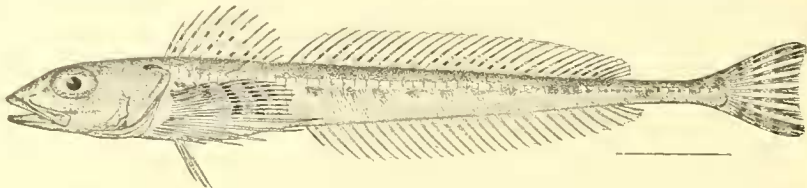


FIG. 58.—*Prionistius macellus* Bean.

119. *Prionistius macellus* Bean.

Recorded from stations 3214, 3218, and 3223, south of Sannak and north of Unimak Island (Gilbert 1895).

120. *Elanura forficata* Gilbert.

Originally described by Gilbert (1895) from stations 3213, 3214, and 3222, south of Sannak and north of Unimak Island.

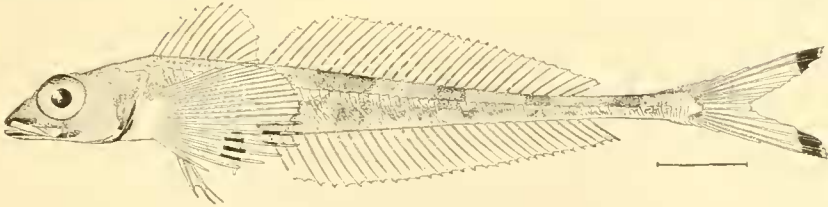


FIG. 59.—*Elanura forficata* Gilbert.

121. *Melletes papilio* Bean.

Originally described by Bean (1880) from St. Paul Island, Pribilof Group. It has not since been taken.

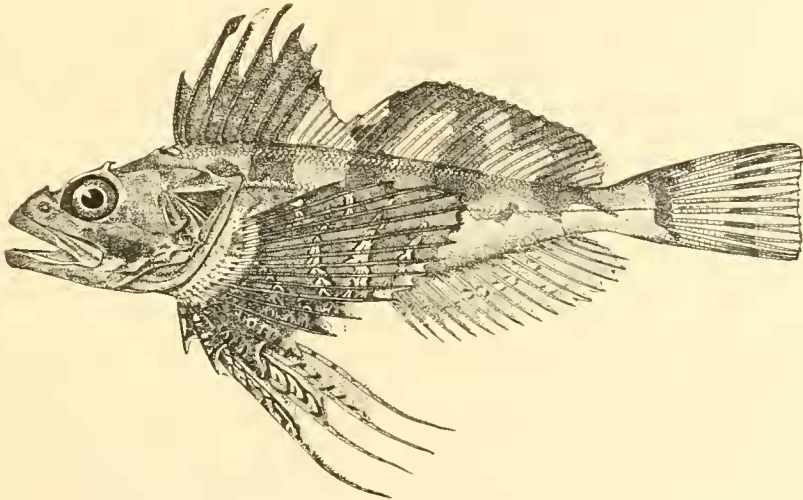


FIG. 60.—*Melletes papilio* Bean.

122. *Hemilepidotus jordani* Bean. *Irish Lord*.

Very abundant practically everywhere along the Alaskan coast. The collection contains specimens from the following localities: Shumagin Islands; stations 4268 and 4270, in Afognak Bay; stations 4283 and 4285, in Chignik Bay; station 4291, in Shelikof Strait. We also have 5 specimens 2 to 17 inches long, collected by the *Albatross* in other years at Sitka, Chignik Bay, and station 3600. The center of abundance for this species seems to be about Kodiak Island and the Alaska Peninsula.

The species was originally described by Bean (1882) from Unalaska, also recorded by him from Port Althorp; Port Chatham, Cook Inlet; St. Paul, Kodiak; Humboldt Harbor, Shumagins; Iliuliuk and Chernofski, Unalaska. By Gilbert from numerous Albatross stations about Anak and Unalaska islands.

The eye varies considerably in size, even in large examples, being usually 4 or even more in head; maxillary 2.3; mandible 2.2; snout 3.6; interorbital 1.3; peritoneum silvery. A specimen 17.5 inches long and weighing 2 pounds, taken over the rail with hook and line at Fox Bay, August 11, had in life the following colors: Side dirty olivaceous, with about 5 broad, irregular, darker blackish bars; belly white, with numerous small, roundish dark spots, few or none on middle line of belly and breast; top of head blackish, side of head somewhat blacker, the opercle and lower part of cheek nearly black;

edges of premaxillary, maxillary, and cheek, side of lower jaw, and first 2 or 3 branchiostegals and membranes rich lemon-yellow, remaining branchiostegals and lower side of head clean white; dorsal dark olive, the anterior portions black; pectoral dirty white at base, dirty olivaceous elsewhere; anal dark; caudal grayish olive, the membranes pale greenish or yellowish; tip of fin light greenish-yellow; eye reddish brown.

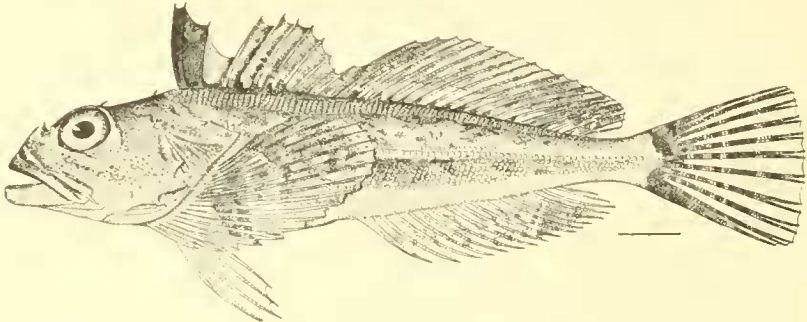


FIG. 61.—*Hemilepidotus jordani* Bean.

A female 13.25 inches long (no. 2985), taken in Chignik Bay, August 10, was full of small eggs.

We have another specimen, 4.75 inches long, from station 3599, in Bering Sea, taken in 1894. In this specimen the ventral fins are much longer than in typical examples, and have many tubercles on the under side. Five examples taken at Sand Point, Shumagin Islands, August 12, gave the following lengths and weights:

Length.	Weight.
<i>Inches.</i>	<i>Lbs. oz.</i>
18 $\frac{1}{2}$	1 15
15 $\frac{3}{4}$	1 13 $\frac{1}{2}$
17 $\frac{1}{8}$	2 2
15 $\frac{3}{8}$	1 14
14 $\frac{3}{8}$	1 6 $\frac{1}{2}$

This interesting fish reaches a length of more than 2 feet, and is abundant about the Aleutian Islands.

It is very frequently taken in the salmon traps and is regarded as a nuisance by the fishermen. It is of some value as a food fish, but is rarely eaten. It is apparently not known in Southeast Alaska.

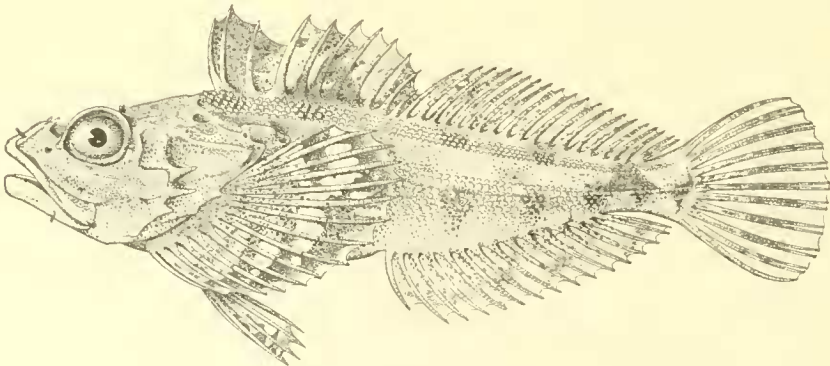


FIG. 62.—*Hemilepidotus hemilepidotus* Tilesius.

123. *Hemilepidotus hemilepidotus* Tilesius. *Red Sculpin*.

Very common, particularly about Kodiak Island and the Alaska Peninsula. The collection contains 9 specimens, 2 to 14.5 inches long, secured at Sucia Island; Hunters Bay; Loring; Killisnoo; Litnik Bay; Karluk; and in Uyak Bay. It has also been recorded (Bean 1882) as *Hemilepidotus traclurus*

from Sitka; Port Althorp; Port Etches; Port Chatham; Cook Inlet; Popoff Strait and Coal Harbor, Shumagin; Unalaska; Kyska; Nazan Bay, Atka; Bay of Islands, Adak; Amchitka; Chichagof Harbor and Attu. Bean (1884), Fort Tongass and Nakat. Nelson (1887), Unalaska.

Known from Kamchatka to San Francisco. Not common in Bering Sea, but appears to be abundant from Sitka to Puget Sound. It reaches a length of 18 inches and should be of some value as a food fish.

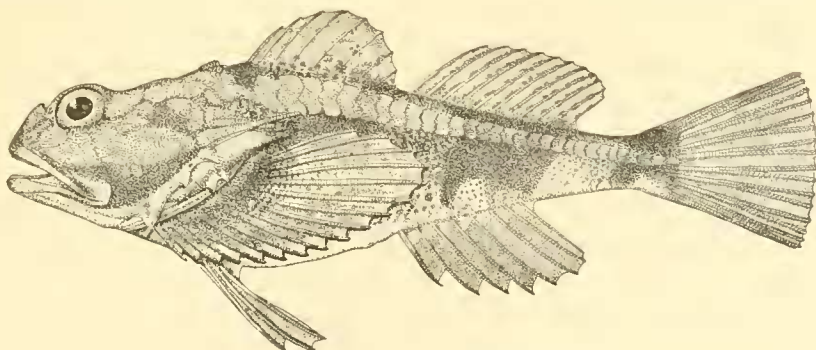


FIG. 63.—*Enophrys bison* (Girard).

124. *Enophrys bison* (Girard).

This sculpin is quite common south of Killisnoo. No specimens were secured by us north of this point. The collection contains 34 specimens, 1 to 9.5 inches long, taken at the following places: Port Townsend; Marrowstone Point; Admiralty Head; Fort Rupert; Kilisut Harbor; Port Alexander; Port Ludlow; Sucia Island; Loring; Yes Bay; Cleveland Passage, and Killisnoo.

The species was recorded by Bean (1882) from Sitka, and from St. Paul, Kodiak Island.

125. *Enophrys claviger* (Cuvier and Valenciennes). (Pl. xvii, fig. 1.)

Recorded by Gilbert (1895) from station 3233, Bristol Bay. No specimens obtained by us.

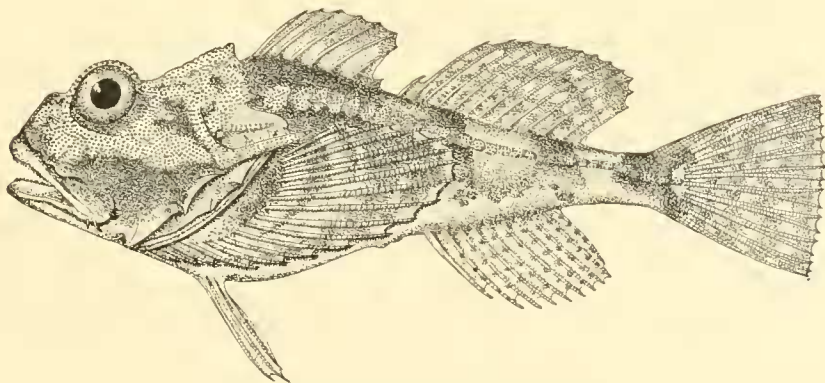


FIG. 64.—*Ceratocottus diceraus* (Pallas).

126. *Ceratocottus diceraus* (Pallas).

Recorded by Bean from Sitka (1882) and Tolstoi Bay and Fort Tongass (1884); by Gilbert from Herendeen Bay (1895), and by Jordan and Gilbert from St. Paul Island (1899, as *C. lucasi*).

We have 3 specimens, 5.75 to 6.25 inches long, collected at Tarcinski, Kamchatka, June 21, and 2 specimens each about 3 inches long and each taken from the stomach of a halibut, one at Killisnoo, July 26, the other somewhere in Southeast Alaska, locality not definitely recorded. These specimens indicate that *Ceratocottus lucasi* Jordan and Gilbert is the young of *C. diceraus*.

127. *Cottus asper* Richardson. *Prickly Bullhead*.

Two specimens, 4 and 4.5 inches long, seined in upper stream of Deep Bay at Loring; 1 specimen, 4.3 inches long, at Loring; 3 specimens, 5.5 to 6.5 inches long, taken on hook and line in Naha River at Loring; 1 specimen, 5.5 inches long, seined in Hunter Bay; 2 specimens, each about 3.25 inches long, taken on hook and line near the Fortmann hatchery; 2 specimens (no. 3031 and 3032), 6.25 and 7 inches long, from Hunter Bay, taken on hook and line.

Thirty-five specimens, 1.75 to 7.5 inches long, collected in McDonald Lake, September 26, 1905. These are variously rough and smooth on the sides. The size does not seem to make any difference in the roughness, it being present or absent in all sizes. The black spot on the posterior part of dorsal disappears in the larger examples.

Seventeen specimens, 3 to 6 inches long, seined in McDonald Lake, August 24, 1905; agree with the preceding in regard to roughness.

Six specimens, 4 to 6.75 inches long, collected in fyke net in McDonald Lake, July 29, 1905. These specimens are smooth, except for a small area under pectoral, which is slightly rough.

Twelve specimens, 3.5 to 5 inches long, seined in McDonald Lake on August 22, 1905. The stomach contents were chiefly snails and parasitic worms. These specimens vary greatly in roughness of body, some having only a slight rough place under pectoral, others of the same size and of different sizes having the entire side of body more or less rough; all have a very distinct black blotch as large or larger than eye on posterior base of spinous dorsal; the fins are otherwise unmarked.

In addition to the above there were secured from Yes Bay and McDonald Lake 26 specimens varying from 2 to 5 inches, and 18 specimens from 2 to 6.5 inches from Loring and vicinity; two of the latter taken in Steelhead Creek, June 19, 1904, were full of nearly ripe eggs.

This species is common in fresh-water streams and lakes about Loring, and at the Fortmann hatchery might be seen any day in the clear waters of the stream or lake. It is reputed to be very destructive to salmon eggs.

Following the suggestion of Mr. J. O. Snyder (in "Notes on the Fishes of the Streams flowing into San Francisco Bay, California," Appendix to the Report of the Commissioner of Fisheries to the Secretary of Commerce and Labor for the year ending June 30, 1904) that *C. asper*, dorsal rays 19 to 22, anal 16 to 18, may be separated from *C. gulosus* dorsal rays 17 or 18, anal 12 to 14, by the greater number of dorsal and anal rays in the former, and also that *C. asper* is confined largely to the lower courses of streams, while *C. gulosus* is found farther up where the water is clear and the current rapid, we identify our specimens as *C. asper*. They were all taken in or near tide water, and the following table of fin counts places them with *C. asper*:

Locality.	No.	Dorsal.	Anal.	Palatine teeth.	Length.
Loring.....	1	VIII, 21	17	Present.....	<i>Inches.</i> 6.5
Do.....	2	IX, 20	17	do.....	5.5
Do.....	3	VIII, 21	17	do.....	6.0
Do.....	4	IX, 20	17	do.....	4.25
Naha River.....	5	X, 21	17	do.....	3.0
Do.....	6	X, 21	17	do.....	3.5

Locality.	No.	Dorsal.	Anal.	Palatine teeth.	Anal length.	Vent.
Hunter Bay.....	7	VIII, 21	16	Present.....	3.0	Posterior.
Do.....	3032	IX, 22	15½	do.....	3.2	Do.
Do.....	3031	IX (+), 22	17½	do.....	3.1	Do.
Loring, Deep Bay.....	8	VIII, 20½	17	do.....	3.0	Do.
Do.....	9	VIII, 21	16½	do.....	2.9	Nearly median.

Length of anal base usually about equal to head, sometimes, as in last example, somewhat longer.

128. *Cottus gulosus* (Girard).

Specimens of this species were secured only at Loring and Boca de Quadra. They were 16 in number and measured 1 to 4 inches in length. Many of the larger ones taken at Loring, May 29, 1904, were full of nearly ripe eggs.

This species is doubtless common throughout Alaska, but being found further up the streams away from brackish water and in places not usually visited by collectors, it has not been taken abundantly or recorded from many places.

129. *Cottus cognatus* Richardson. *Great Bear Lake Bullhead.*

One of the most interesting results of the side trip made to the headwaters of the Yukon was the securing of a fine series of specimens of *Cottus cognatus*. Until now the type of this species had remained unique, no additional specimens having come into any museum or having been collected by any naturalist so far as we are informed.

At Lake Bennett, July 19-21, 1903, 45 specimens were collected. They were obtained by the use of the seine at various places along the shore, chiefly toward the head of the lake above the railroad station and near the crossing of the Yukon and White Pass Railroad. These specimens range in length from 1.2 to 3½ inches. Although the original description is very brief there is no doubt in our mind as to the identification. Following is a detailed description:

Head 3.66 to 4.1 in length; depth 5.13 to 6.2; eye 3.8 to 4.66 in head; snout 3.6 to 4; maxillary 2.25 to 2.5; mandible about 2; interorbital width 5.25 to 6; dorsal usually VIII-17 (VIII-15, VIII-16, IX-15, IX-17, and IX-18 indicate the range of variation); longest dorsal spine about 3 in head; longest dorsal ray 1.75 to 2; anal usually 11 or 12, varying from 10 to 13; longest anal ray about 1.75; pectoral 13 or 14, its longest rays (14 or 15) 3.87 to 4.2 in head, lowermost 7 or 8 rays thick, but not branched; ventral 1, 3, the length 5.5 to 6 in head; caudal lobes about 5.

Body rather heavy forward, tapering gradually to the rather slender caudal peduncle; head moderate, evenly rounded above, interorbital space narrow, slightly concave; mouth moderate, somewhat oblique, maxillary reaching middle of pupil, lower jaw slightly included; branchiostegal rays 6; gill-membranes separate, joined to the isthmus; villiform teeth on jaws and a small patch on the vomer; caudal peduncle slender, its least width about 2 in its least depth; head entirely smooth; preopercle with a single spine at the angle projecting backward and upward, chiefly concealed by skin; lower edge of preopercle with one rather distinct broad spine projecting downward and forward, in front of which is another poorly defined spine or blunt point; opercle without spine; no other spines or filaments about head; body entirely smooth except a patch of small roughish scales under the pectoral; fins well developed, spinous and soft dorsal barely connected; caudal truncate or slightly rounded; pectoral broad at base, the tip reaching past beginning of anal; ventrals scarcely reaching vent; vent usually somewhat nearer tip of snout than base of caudal; there is, however, some slight variation in this character; in one specimen, apparently a female, it is equally distant from tip of snout and base of caudal.

A specimen 3¼ inches long was, in life, dark olive, much mottled; trace of about 6 dark saddles less distinct than in most specimens; first dorsal blackish olive with a narrow orange edge, the fin mesially darker; second dorsal dusky olive and translucent, the olive in irregular blotches; caudal with 4 or 5 vague bars of darker olive; ventrals and anal uncolored; pectoral brown with 4 narrow irregular dark bars, the coloration more olive and more uniform than usual; a patch of light colored, rather coarse prickles behind axil; belly silvery; lower jaw greenish, faintly barred with 5 black dots.

There are two patterns of coloration, probably representing the two sexes, a darker and a lighter phase. The darker phase may be described as follows: Sides and top of head, anterior portion of body, the beginning of soft dorsal, and sides of body along base of soft dorsal and upper part of caudal peduncle, dark or blackish, more or less vermiculated with lighter; base of caudal fin with a large Y-shaped black area; tip of lower jaw dark; under side of head and entire lower parts of body yellowish white, profusely covered with numerous minute black or brownish punctulations; spinous dorsal black, white at the tip; soft dorsal vermiculated with dark and light, the distal half lighter; anal yellowish-white with fine dark punctulations; caudal dirty white, with fine dark punctulations and evidence of faint darker cross-bars; pectoral dark on basal two-thirds, lighter at the tip, with rather distinct vertical cross-bars of dark and light; ventrals yellowish-white, somewhat punctate with dark.

A specimen of the lighter phase may be described as follows: Head and upper parts of body brownish white, blotched with darker; occipital region dark; back with about 6 dark or brownish saddles, distributed as follows: The first, which is very small, at beginning of spinous dorsal, the second under last dorsal spines, the third under third to sixth dorsal rays, the fourth under eighth to tenth dorsal rays, the fifth under the last dorsal rays but one, and the sixth on base of caudal fin; the third and fifth

plainest and extending below the lateral line; entire under parts yellowish-white with very fine dark punctulations; fins essentially as in the darker form.

Cottus cognatus Richardson, Fauna Bor.-Amer., III, 40, 1836, Great Bear Lake. Günther, Cat., II, 157, 1860. Jordan & Evermann, Fishes North and Mid. Amer., pt. II, 1954, 1898.

130. *Cottus aleuticus* Gilbert.

Ninety-nine specimens 3 to 4 inches long collected by Mr. Rutter in Lake Karluk during the summer of 1903.

Head 3.75 to 3.85 in length; eye 5 in head; dorsal IX, 19; anal 12 or 13; pectoral 15.

The collection contains also 3 specimens 4 to 4.5 inches long from a small stream at the head of the flume at the Loring cannery, July 26; 4 specimens 2.75 to 3.25 inches long from the stream at the Fortmann hatchery, July 7, taken on hook and line; and 2 specimens 2.75 to 3.75 inches long from Steelhead Creek near Loring, May 8.

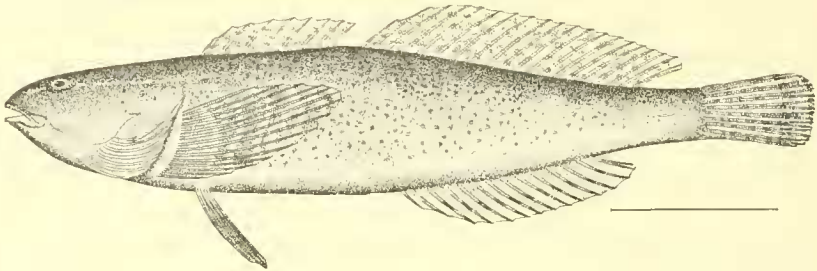


FIG. 65.—*Cottus aleuticus* Gilbert.

The Karluk specimens show quite a different color pattern from those taken at Loring, the body being much darker and plainer, with very little vermiculation or marbling; the fins sometimes marbled with dark; the spinous dorsal sometimes plain with very small dark punctulations, or the upper half of fin black, edged with white, these punctulations sometimes found on soft dorsal and anal. Many of these specimens have tubercles on ventral and pectoral fins, those on the ventrals sometimes arranged in patches.

The lateral line is not always complete, does not drop abruptly at end of soft dorsal, but ends there in some specimens, generally those with plain soft dorsal.

This species has been recorded by Bean (1882) as *Uranidia microstoma*, from Indian River, Sitka; St. Paul, Kodiak Island; Aleutian Islands; Iliuliuk, Unalaska. Gilbert (1895) from Iliuliuk, Unalaska. Rutter (1899), Karluk River and Lake and in Alitak Lake. Nelson (1887), mouth of Tanana River.

131. *Cottus chamberlaini* Evermann & Goldsborough, new species.

Head 3 in body; depth 4.3; eye 3.75 in head; snout 3.9; maxillary 2.5; interorbital space 5 in eye; dorsal IX-16, longest spine 3.3 in head, the longest ray 2.3; anal 11, longest ray 2 in head; pectoral 14, the length equal to that of head; ventral 1, 4, the length 1.6 in head; branchiostegals 6.

Body fusiform, tapering rather rapidly from the heavy head to the long slender caudal peduncle, the body usually considerably constricted at the vertical connecting origins of anal and soft dorsal; head rather large; snout short; mouth moderate, low, nearly horizontal, the maxillary scarcely reaching front of pupil; a small patch of teeth on vomer, palatines naked; eyes large, high up and close together; interorbital space very narrow; anterior nostril in a very distinct tube; posterior nostril in an evident tube, which is shorter than that of the anterior; head entirely smooth, without cirri or spines except those on opercular bones; preopercle with one simple sharp spine at the angle, projecting backward and curved upward somewhat; edge of preopercle below this smooth or merely crenulate; opercle ending in a soft flap, subopercle with a rather distinct blunt spine projecting downward; body entirely smooth, except a small patch of asperities under the pectoral; lateral line complete or nearly so. Fins moderate; interval between spinous and soft dorsal short, but distinct; origin of spinous dorsal posterior to base of pectoral a distance equal to one-third diameter of eye; origin of anal slightly posterior to that of soft dorsal; caudal slightly rounded; pectoral long, reaching origin of anal; ventrals short, not reaching vent.

Color in alcohol: Upper parts dark, mottled with darker irregular blotches and lighter areas; about 4 distinct dark vertical blotches, one under spinous dorsal, 2 under soft dorsal and 1 on caudal peduncle; under parts yellowish-white, profusely covered with minute brown punctulations; spinous dorsal dusky, each ray with 1 or 2 black spots, the eighth spine almost entirely black, edge of fin creamy white; soft dorsal dusky, with numerous irregular black blotches, the edge somewhat creamy; anal pale, punctate with dark; caudal yellowish-white, crossed by 4 or 5 irregular, dark, vertical bars; pectoral similar to soft dorsal; ventrals white. The numerous specimens examined show but little variation, as may be seen from an examination of the following table:

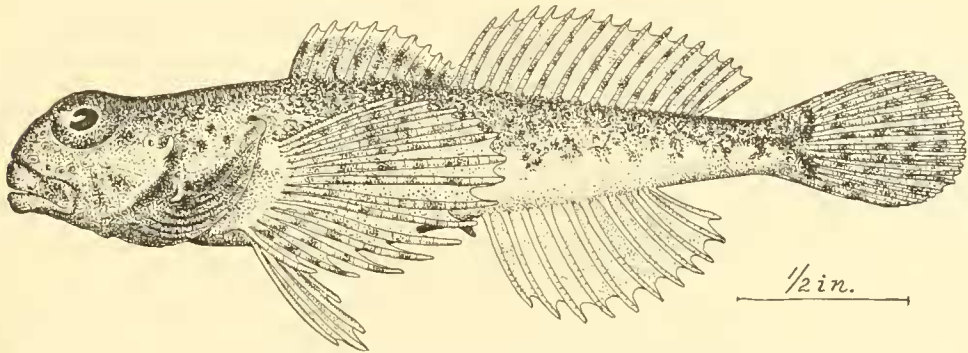


FIG. 66.—*Cottus chamberlaini* Evermann & Goldsborough, new species. Type.

VARIATION IN THE TYPE AND COTYPES OF *COTTUS CHAMBERLAINI*.

Tag No. ^a	Length in inches.	Head.	Depth.	Eye.	Snout.	Maxillary.	Interorbital in eye.	Dorsal fin.			Anal for mulla.
								Formula.	Longest spine in head.	Longest ray in head.	
119	2.9	3.2	4.3	3.75	3.9	2.5	5.0	IX, 16	3.3	2.3	11
120	2.9	3.0	5.1	3.5	3.8	2.5	4.8	VIII, 16	3.3	2.3	12
121	2.2	3.1	4.6	3.1	4.8	2.9	4.5	IX, 17	.....	.....	12
122	2.37	3.1	4.5	3.5	4.0	2.5	5.0	VIII, 16	.....	.....	12
123	2.63	3.2	4.5	3.2	4.0	2.0	4.5	VIII, 16	.....	.....	11
124	2.25	3.2	4.75	3.25	4.25	2.6	4.5	VIII, 16	.....	.....	12
125	2.0	3.1	4.5	3.2	3.1	2.3	4.5	VIII, 16	.....	.....	11
126	2.25	3.0	4.8	3.5	4.0	2.5	4.4	VIII, 16	.....	.....	11
127	1.75	3.5	5.0	3.5	5.0	3.0	5.0	VIII, 16	.....	.....	11
128	2.75	3.2	5.0	3.0	4.75	2.3	5.0	VIII, 16	.....	.....	11

^a No. 119, type; nos. 120-128, cotypes.

This species seems to be related to *Cottus beldingi* and to *Cottus spilotos*. From the former it may be distinguished by the much larger eye, the narrower interorbital, the blunter head, the fewer anal rays, and the coloration; from *Cottus spilotos* it would seem to differ in the shorter anal, the more complete lateral line, in coloration and in other respects.

The collection contains 217 specimens, which we refer to this species. They vary in length from less than 1 inch to 2.9 inches. The collector's label, which should have accompanied these specimens, has been lost, but it is certain that they came from fresh water at Loring, Alaska, and that they were collected by Mr. F. M. Chamberlain in 1903.

Type no. 57823, U. S. National Museum, a specimen (no. 119) 2.9 inches long, probably from Loring, Alaska; cotypes, several specimens no. 61052, U. S. National Museum; no. 5230, Bureau of Fisheries; no. 20011, Stanford Univ. Mus.

We take pleasure in naming this species for our friend and associate, Mr. Fred. M. Chamberlain, naturalist of the steamer *Albatross*, who collected the type.

132. *Myoxocephalus polyacanthocephalus* (Pallas). *Great Sculpin*.

The collection contains 25 specimens, from 1.75 to 13 inches long; collected in 1903, at the following places: Marrowstone Point; Cleveland Passage; stations 4270 and 4272, Litnik Bay; Karluk; Admiralty Head; Metlakatla; Funter Bay; Point Ellis; Port Alexander; Snug Harbor, and Yakutat. The species was seen also at Dundas, Pablof, Sitkoh, and Uyak bays.

These specimens show that there is considerable variation in the relative distances between the supraocular spines themselves and the occipital spines. The distance seems to be relatively greater in the young examples than in the older ones.

In the larger specimens the general color is much darker than in the smaller ones, the light colors, especially posteriorly, fading into darker; belly and ventral fins distinctly mottled and spotted. In all the smaller examples the belly is pale and there are 3 very distinct dark bars across the body; the first under the sixth to eighth dorsal spines, extending slightly forward and downward across base of pectoral; the second under soft dorsal, beginning under the third ray, and extending under nearly full length of fin and downward nearly to anal, this bar more or less broken at its center and sometimes divided, forming 2 bars, which may be called second and third, 1 over anterior, the other over posterior part of soft dorsal; the last bar (fourth when the second is divided, otherwise third) covering posterior part of caudal peduncle.

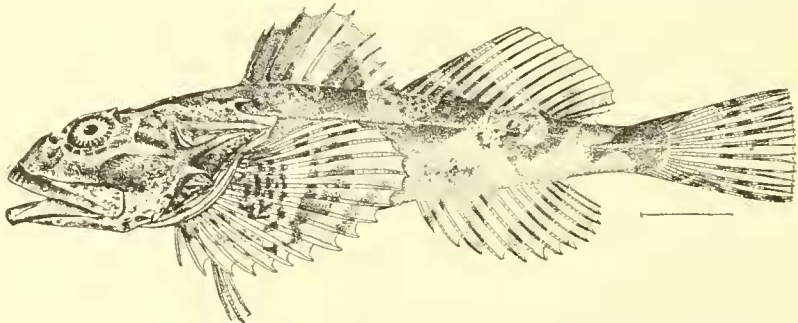


FIG. 67.—*Myoxocephalus polyacanthocephalus* (Pallas).

Mr. Rutter secured at Karluk, June 8-10, 1903, 18 very small specimens one-half to 1 inch long and 3 specimens 3.75 to 6 inches long. The 6-inch specimen had in its stomach 4 *Blennicottus acuticeps*, each 1.75 inches long and 1 *Pholis ornatus* 4 inches long. They were very little digested, the *Pholis ornatus* scarcely at all.

Another specimen (no. 2178), 20.5 inches long, collected by the *Albatross* at Kodiak Island in Uganuk Bay, 1897, differs from current description in that the pectoral does not reach the anal by a distance equal to length of second dorsal spine, and the preopercular spine is not longer but slightly shorter than diameter of eye.

The collection contains 24 additional specimens collected by the *Albatross* at dates other than 1903. These vary from 2.75 to 18.5 inches in length, and were taken at Sucia Island; Promise Island; Mary Island; Nichols Bay; Hunters Bay; Niblaeks Anchorage; Sitka; Litnik Bay; Uganuk Bay; Kyska Island, and Atka Island. Four small specimens were collected by Mr. M. C. Marsh at St. Paul Island in 1906.

This species was originally described from the Aleutian Islands by Pallas (1811). Bean (1880) records it from Unalaska, and (1882) from Wrangell; Sitka; Port Mulgrave, Yakutat Bay; Refuge Cove, Cook Inlet; St. Paul, Kodiak Island; Humboldt Harbor, Pirate Cove and Popof Island, Shumagins; Iliuliuk and Chernofski, Unalaska; Nazan Bay, Atka; Amchitka; Port Moller and Cape Lisburne; also (1884) from Mary Island; Makushin Bay; Unalaska Harbor; near mouth of Unalaska River; Shaw Bay, Unimak Island; and Herendeen Bay. Gilbert (1895) records it from a number of stations in Bristol Bay. Turner (1886) records it from the Aleutian Islands; Scofield (1899) from Chignik Bay; Rutter (1898) from Karluk, and Nelson (1886) from Unalaska.

133. *Myoxocephalus jaok* (Cuvier & Valenciennes).

Two specimens, 11 and 9.5 inches, respectively, collected at Tareinski Harbor, Kamchatka, June 21, 1901. The following description is taken from the larger example:

Head 2.5 in length; depth 6.2; eye 6.5 in head; snout 3.75; maxillary 2.1; mandible 2.1; interorbital equal to eye; dorsal viii, 15; anal 14; pectoral 18; caudal with 9 forked rays; ventral i, 3; lateral line about 46.

Body elongate, somewhat depressed anteriorly, terete posteriorly; caudal peduncle stout and short, flattish above and below; head long, its profile nearly straight, a depression between eyes and the sharp high nasal spines, a very prominent rounded projection between the latter, into which the premaxillary projects, the outline from this projection to snout straight and steep; snout somewhat acute; mouth large, gape extending to below middle of pupil; maxillary extending a distance equal to pupil beyond posterior margin of orbit, its breadth 1.3 in eye, its edge slipping somewhat under the preorbital and its body as a whole fitting into a depression in the cheek so that its surface is on a level with the cheek, thus matching the rest of the cheek in surface and color; maxillary inconspicuous; upper lip a broad, high fold, lying well back over the anterior edge of maxillary; teeth small, sharp, in broad villiform bands in jaws, the inner rows somewhat larger, sharper, these depressible and pointing backward; band of teeth in upper jaw interrupted by a narrow mesial fold; teeth on vomer in a rather large V-shaped patch, the teeth larger than those of jaws; palatines toothless; tongue large, bluntly round.

Anterior nostril in front of eye and considerably below nasal spine, posterior nostril a prominent tube above and behind anterior nostril and midway between nasal spine and eye; interorbital space rather broad, concave, continuous with the somewhat broader and flatter occipital space; nasal spines high and sharp, supraoccipital ridges high, terminating posteriorly in a rather blunt conical postocular spine, this with a smaller tubercle in front, several short ridge-like tubercles behind them; parietal ridges prominent converging posteriorly, terminating in rather sharp backward projecting spines, on the outer side of this ridge a concave depression bounded by a broken elevated ridge; suborbital stay prominent, slender, long, striate, extending from beneath eye nearly to root of upper preopercular spine; preopercular spines 3, the upper much the longer, about equal to eye, pointing backward and slightly upward, covered with skin nearly to the tip; second spine conical, acute, not half as long as upper, pointing backward and somewhat outward; lower spine stout, short, pointing downward and forward; opercular spine short, stout, and sharp, terminating a long high ridge, which extends anteriorly almost to base of opercle, preopercular flap extending some distance beyond the spine; scapular spine short, sharp, and stout, terminating a high ridge, at the base of which is a small tubercle; gills with a long slit behind the last.

Origin of spinous dorsal on a vertical with tip of scapular spine, the base 2.3 in head, the third spine longest, 3.6 in head the membrane reaching nearly to the tips of the spines behind, somewhat scalloped between them, the margin of the fin straight, descending regularly from the third to eighth, which is very short and without free margin; space between spinous and soft dorsals 2 in eye, base of soft dorsal 1.5 in head, its rays about equal, except a few of the last, the longest rays 3.1 in head, none of the rays projecting beyond membrane; contour of fin somewhat rounded in front, upper margin straight; anal similar to soft dorsal, its origin under base of third dorsal ray, its base 2.1 in head, its median rays about 3.75 in head; caudal truncate, tips of the rays slightly projecting; pectoral broad, rounded, the rays stout and simple, the lower somewhat stouter and much shorter, acute, somewhat free at tips, the broad procurrent base well covered by the gill-membranes, length of fin 1.75 in head, its tip scarcely reaching vent; ventrals 3.1 in head, narrow, inner rays longest, tips reaching half way to vent.

Body naked, a row of stellate disks above and quite near to lateral line, an irregular patch of similar but smaller disks in axillary region, extending backward in a single row, but becoming mere sharp prickles posteriorly; top and sides of head covered as far back as base of dorsal with small warty prominences, those in occipital region depressed and crater-like at the top, those in the latero-occipital pits rounded; no cirri.

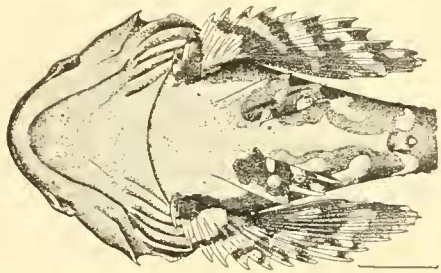


FIG. 68.—*Myoxocephalus jaok* (Cuvier & Valenciennes).

General color in alcohol: Above brownish olivaceous, irregularly blotched and speckled with black, especially above the pectoral, belly white; head conspicuously speckled with black dots, especially on cheeks and interorbital; occiput dark, upper lip blackish, edge of lower lip black; pectoral irregularly mottled with black, the black spots tending to arrange themselves in crossbands; dorsals faintly mottled with dusky; caudal with 2 irregular faint cloudy bars; ventral with 3 black blotches, the anterior somewhat more distinct, these blotches tending to form 3 faint bars; ventrals pale; peritoneum silvery.

Another specimen, 15 inches long, from Albatross station 3250, Bering Sea, June 13, 1890, had the under part of the pectoral rays covered with sharp tubercles.

No. 2408, a specimen 9 inches long, collected in Unalaska, July 2, 1900, while agreeing in general appearance with typical *juok*, differs in having the supraoccipital tubercle elongated into a rather long, sharp ridge more or less rough on the edges and inclined to be broken up into a series of tubercles. This tubercle is apparently quite variable, as in another specimen the left tubercle is preceded by a smaller one.

Previously recorded by Bean (1882), as *Cottus humilis*, from Chamisso Island, Eschscholtz Bay. Gilbert (1895), St. Michael and Point Belcher, Arctic Ocean. Townsend (1887), Nushagak River; stations 3290, 3228 to 3230, 3233, 3244 to 3245, 3248 and 3250, all in Bristol Bay; Cape Prince of Wales. Nelson (1887), as *Cottus taxiopterus*, St. Michael. Nelson (1887), as *Cottus humilis*, St. Michael. Turner (1886), as *C. humilis*, St. Michael. Scofield (1899), Port Clarence and Grantley Harbor.

This species reaches a length of 18 inches and occurs in shallow water everywhere about Bering Sea, extending into the Arctic and south to the Amur River and Unalaska.

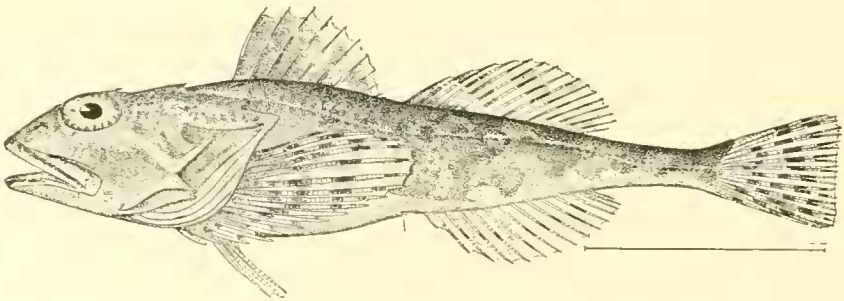


FIG. 69.—*Myoxocephalus verrucosus* (Bean).

134. *Myoxocephalus verrucosus* (Bean).

One example, 15 inches long, seined at Litnik Bay August 3, and another of same size collected by Luttrell at Sitka. This species was previously recorded from Unalaska and Bristol Bay (Gilbert 1893), and Kings Island, Port Clarence, and Grantley Harbor (Scofield 1896). One specimen from Litnik Bay has the following characters:

Head 2.33 in length; depth 4.16; eye 6.4 in head; snout 3.5; maxillary 2.20; mandible .216; interorbital 1.1 in eye; dorsal x=16; anal 13; pectoral 18; branchiostegals 6.

Body stout, tapering to stout caudal peduncle; both dorsal and ventral contours nearly straight; head large, flattened above, but not so manifestly depressed and widened as in many cottoids; mouth horizontal, rather large, the maxillary extending to posterior margin of pupil; mouth cavity large, somewhat dusky; armature of head poorly developed, the spines (nasals, postoculars, occipital and preopercular) short and blunt; short nasal tubes developed; top of head very warty; no filaments anywhere; supraorbital and occipital filaments not present; dorsals not closely connected.

General color darker than in description; the large white spots on belly are also found on pectoral and ventrals; the anal has white bars instead of spots; on the under side of some of the pectoral rays is a series of stiff tubercles, these also found on upper side of ventrals.

135. *Myoxocephalus axillaris* (Gill).

Nelson (1887), St. Michael, as *Cottus axillaris*. Scofield (1899), Port Clarence; Chignik and Herendeen bays. Not seen by us.

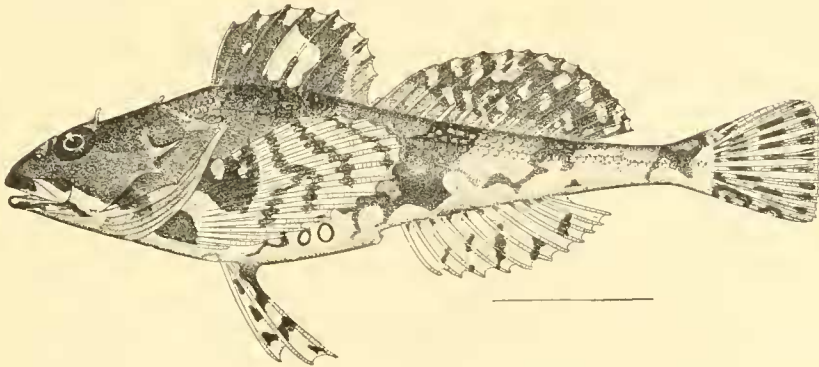


FIG. 70.—*Myoxocephalus axillaris* (Gill).

136. *Myoxocephalus stelleri* Tilesius.

We have 3 specimens, 10.5 and 5.25 inches long, from Tarbinski Harbor, Kamchatka, June 20, 1900, and one 10 inches long from Unalaska, July 2, 1900. Recorded from Point Barrow by Murdoch (1885) as *Cottus decastrensis*.

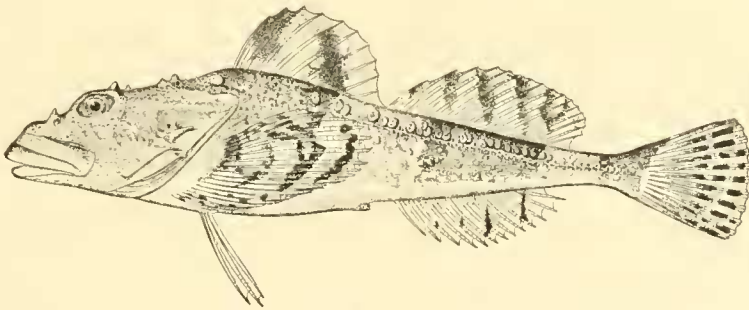


FIG. 71.—*Myoxocephalus stelleri* Tilesius.

137. *Myoxocephalus niger* (Bean).

We have in our collections 4 specimens 2 to 6 inches long taken by Mr. M. C. Marsh at St. Paul Island, Pribilof Group, July, 1906. Originally described by Bean (1882) from St. Paul Island, Bering

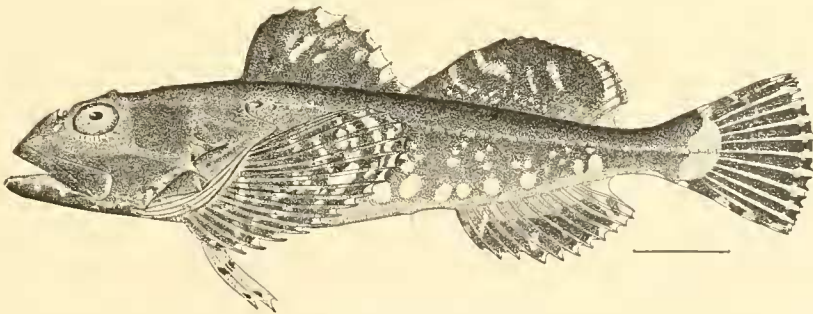


FIG. 72.—*Myoxocephalus niger* (Bean).

Sea, and recorded by him from Sanborn, Shumagins; also recorded from St. Michael (Nelson 1887 as *Cottus niger*); and from the Pribilof Islands (Jordan & Gilbert 1899).

138. *Megalocottus platycephalus* (Pallas).

No. 2401, a female specimen 13 inches long, with minute eggs, collected at Tareinski Harbor, Kamchatka, June 21, 1900. This specimen appears to be *M. platycephalus*, though differing in some respects from current descriptions.

Head 3 in length; depth 5; eye 6.2 in head; snout 4; maxillary 2; mandible 1.6; interorbital 3.3; dorsal ix-14; anal 12; pectoral 16; caudal 11, 8 of them forked; ventral 3; lateral line 36.

Body depressed anteriorly, subterete posteriorly, dorsal outline nearly straight and horizontal from tip of snout to tip of spinous dorsal when depressed, thence gradually sloping to base of caudal; ventral outline sloping rapidly upward from tip of lower jaw to gill-slits, from thence nearly straight; lower jaw long and projecting, cleft of mouth nearly vertical; contour viewed from above, coffin-shaped, or long kite-shaped, widening rapidly from the tip of the truncate lower jaw to the preopercular spines where it is broadest, from thence tapering gradually to the stoutish caudal peduncle.

Head short, broad, and flat; a large flat, sunken hexagonal area extending from the nasal spines to the occiput, bounded on the sides by the high diverging supraocular and converging parietal ridges; the postocular tubercle high, large and blunt, pointing inward; occipital tubercle prominent, pear-shaped, pointing backward, ending in a stout sharp spine; preopercular spines covered with skin, upper longer than eye, curved upward and inward, second about half as long as first, third spine prominent but blunt, fourth strong, pointing downward and forward; suborbital stay narrow, striate and curved, upper opercular spine short, sharp, stout, almost concealed, pointing backward and downward at the end of a high ridge, the round flap reaching considerably beyond the spine; 2 prominent tubercles

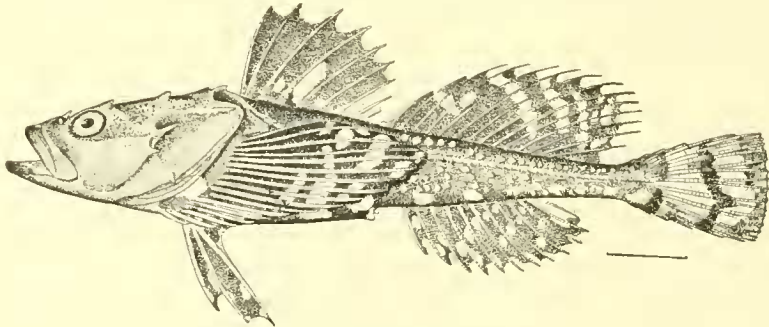


FIG. 73.—*Megalocottus platycephalus* (Pallas).

at top of gill-slit, these sometimes spinous, and one or more stout suprascapular spines; a strong humeral spine; teeth in strong villiform bands in jaw, a large patch on vomer, none on palatines; tongue large, rounded and prominent; a well-developed symphyseal knob; maxillary extending to posterior margin of pupil; a deep cleft behind last gill, slit minute. Spinous dorsal beginning a distance about equal to snout behind tip of gill-flap, its base 1.5 in head, its fourth spine longest, 2.5 in head, its margin rounded, distance between it and soft dorsal equal to eye, latter high, largest ray 1.5 in head, its base 1.1 in head, its margin rounded, somewhat acute behind, the last rays somewhat produced; caudal truncate, 1.5 in head; origin of anal below fourth dorsal ray, base 1.3 in head, rays stout, margin somewhat emarginate (scalloped), longest rays about 2.1 in head; pectoral very broad, the lowest rays short and stout, membrane between them deeply incised, general outline rounded, upper ray short, base procurrent along the edge of gill opening, length slightly longer than head, tip barely reaching origin of anal; ventrals acute, outer ray stout, inner produced, length 1.2 in head, tips not reaching vent by a distance greater than snout; skin naked; top of head warty, sides naked, no flaps anywhere; a row of prominent prickly tubercles between lateral line and dorsal; a few irregular small tubercles in a row beneath lateral line posteriorly.

Color in alcohol: Above uniform brown, sides below olivaceous, belly white; lower lip and chin uniform black; membranes of upper lip dusky, lower side of lower lip white, the exposed portion all black; isthmus and edge of gill-cavity dusky; vertical fins irregularly mottled and blotched white and brown; inside of pectoral marked with broad brown and narrower white crossbars, outside similarly marked but not so distinctly; ventral with 2 or 3 irregular brown crossbars with narrow white interspaces; peritoneum white.

These characters are probably sexual or are explained by the large size of this specimen.

The collection contains also no. 2394 and 137. 8.5 and 7.5 inches long, collected at Petropaulski, 1900; no. 2404, a specimen 9.5 inches long, no locality, probably off Kamchatka.

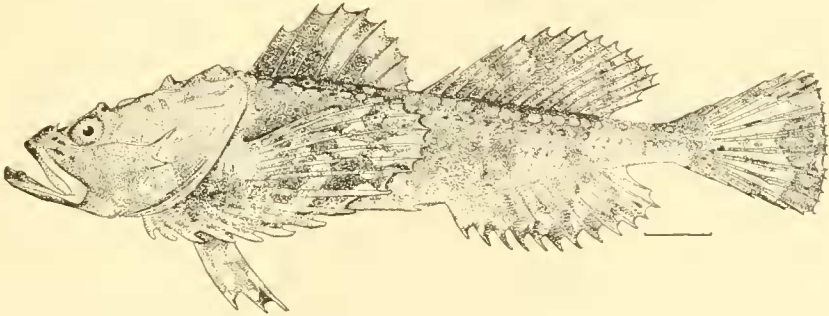


FIG. 74.—*Megalocottus laticeps* (Gilbert).

139. *Megalocottus laticeps* (Gilbert).

Described originally (Gilbert 1895) from Nushagak River and Herendeen Bay. Recorded as: *Cottus taeniopterus*) by Bean (1882) from Point Belcher, Arctic Ocean; Hagmeister Island, Bering Seas and St. Michael. Turner (1886), Norton Sound, and Scofield (1899), Port Clarence. No specimens obtained by us.

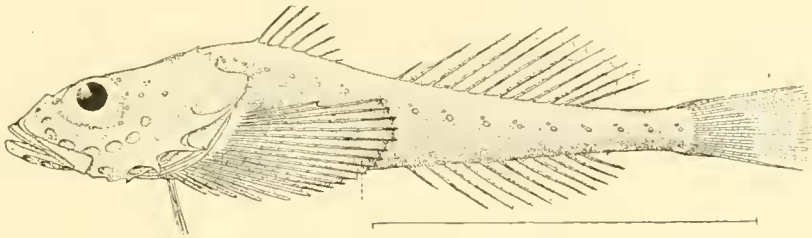


FIG. 75.—*Zesticelus profundorum* (Gilbert).

140. *Zesticelus profundorum* (Gilbert).

Originally described by Gilbert (1895) as *Acanthocottus profundorum* from station 3329, north of Unalaska.

141. *Thecopterus aleuticus* Smith.

Described from Albatross station 3785, in Bering Sea, 150 miles north of Rat Islands, at a depth of 270 fathoms. Only the type known.

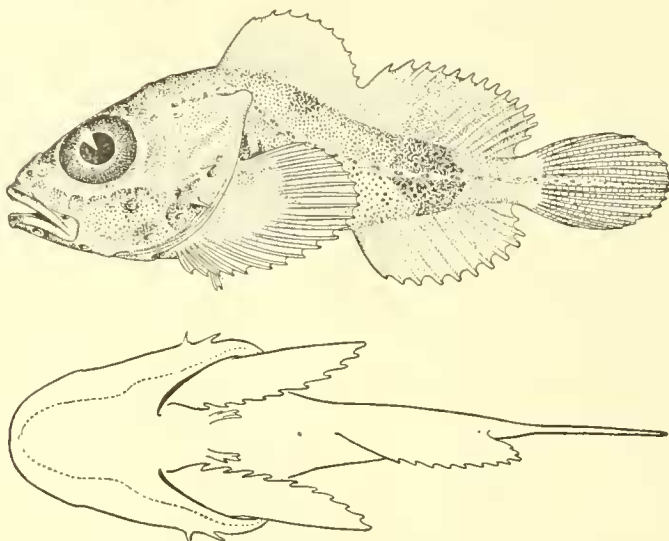


FIG. 76.—*Thecopterus aleuticus* Smith. Type.

142. *Dasycottus setiger* Bean.

One specimen 3.25 inches long, collected by the *Albatross* at station 3602, Bering Sea; 36 specimens from 1.2 to 8 inches in length from stations 4223 in 48 fathoms; 4237 in 194 fathoms; 4248 in 71 fathoms; 4250 in 66 fathoms; 4254 in 45 fathoms; 4275 in 35 fathoms; 4280 in 32 fathoms; 4281 in 42 fathoms; 4286 in 57 fathoms; 4287 in 66 fathoms; 4288 in 67 fathoms; 4290 in 99 fathoms; 4295 in 92 fathoms; 4296 in 35 fathoms. Besides the above, specimens were seen at stations 4191, 4220, and 4298.

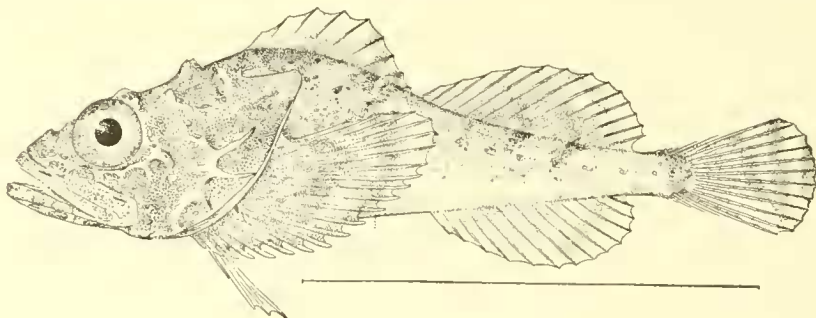


FIG. 77.—*Dasycottus setiger* Bean.

In the young (1 inch) the eye is round, not elongate; spines on head not so prominent, color darker.

Originally described by Bean (1891) from Albatross station 2855, off Sitkalidak Island. Recorded from stations 3216, 3257, 3310, 3311, and 3324, north and south of the Alaskan Peninsula and north of Unalaska Island (Gilbert 1895), and off Karluk (Jordan & Gilbert 1899).

143. *Malacocottus zonurus* Bean.

The collection contains the following specimens of this species: 4 from station 4253, 1 from station 4232, 3 from station 4230, 1 from station 4198, and 1 from station 4292. Others were seen at St. Mary's Mission, mouth of Oat Bay, at Boca de Quadra, and at Kasaan Bay. These specimens range in length

from 2.75 to 7.5 inches, and agree well with current descriptions. The key in Fishes of North and Middle America, however, is defective, in that it would require this genus to have the gill-membranes free from the isthmus, which, of course, is not the case.

Originally described by Bean (1891) from Albatross station 2853, off Trinity Islands. Recorded by Gilbert (1895) from stations 3227, 3330, and 3331, north of Unalaska, and from stations 3337 and 3339, south of Unima Pass.

144. *Porocottus sellaris* (Gilbert).

Described by Gilbert (1895) as *Acanthocottus sellaris*, from stations 3229 to 3234, 3244, 3247, and 3300, all in Bristol Bay.

145. *Porocottus quadrifilis* Gill.

Recorded from St. Michael and Kogiktoiwik (Nelson 1887).

146. *Porocottus bradfordi* Rutter.

The collection contains 27 specimens collected at Karluk Beach, June 8-10, 1903, and no. 2223, also from Karluk, 1903.

Originally described by Rutter (1899) from Karluk.

147. *Oncocottus quadricornis* (Linnaeus).

Recorded from Point Barrow and Meade River (Murdoch 1885), and St. Michael (Nelson 1887), as *Cottus quadricornis*.

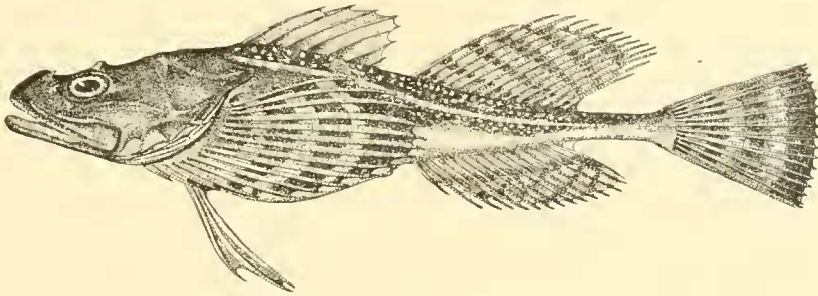


FIG. 78. —*Oncocottus quadricornis* (Linnaeus).

148. *Oncocottus hexacornis* (Richardson). (Pl. XVII, fig. 2.)

Recorded from Herschel Island and Grantley Harbor (Scofield 1896).

We have 3 specimens which we provisionally identify with this species: no. 90, 91, and 92, 8 to 9 inches long, collected by Dr. Gilbert from a salmon trap at Graveyard Point, Kvichak River, near Koggiung, July 16, 1903.

Head 3.16 in length; depth 5.75; eye 6.8 in head; snout 4.75; maxillary 2; mandible 1.9; inter-orbital 6; dorsal VIII-14; anal 14; ventral 1, 3; pectoral 17; branchiostegals 6.

We have also a specimen 2 feet long, no. 2179, collected by the *Albatross* in Uganik Bay, Kodiak Island. As it differs somewhat from the above and from current descriptions of the species, we give a full description of it:

Head 2.75 in length; depth 5.25; eye (orbit) 8.55 in head (orbital rim 6.2); snout 3.3; maxillary 1.66; mandible 2; interorbital broader than length of orbit but not equal to orbital cavity, 2 in snout; dorsal IX-14; anal 13; pectoral 19; ventral 1, 3; caudal 9 forked rays; branchiostegals 6.

Body elongate; ventral outline straight; dorsal outline from tip of snout to end of spinous dorsal gently arched and slightly bulging, from there to base of caudal straight, the head, however, slightly depressed; posterior part of body somewhat compressed; caudal peduncle rather long but stout, its length 1.1 in snout, its depth about half its length.

Head large and broad, the snout rather blunt, its anterior profile a straight slope from the prominent tubercle of the premaxillary pedicel; mouth wide and capacious, the gape extending to below pupil, the

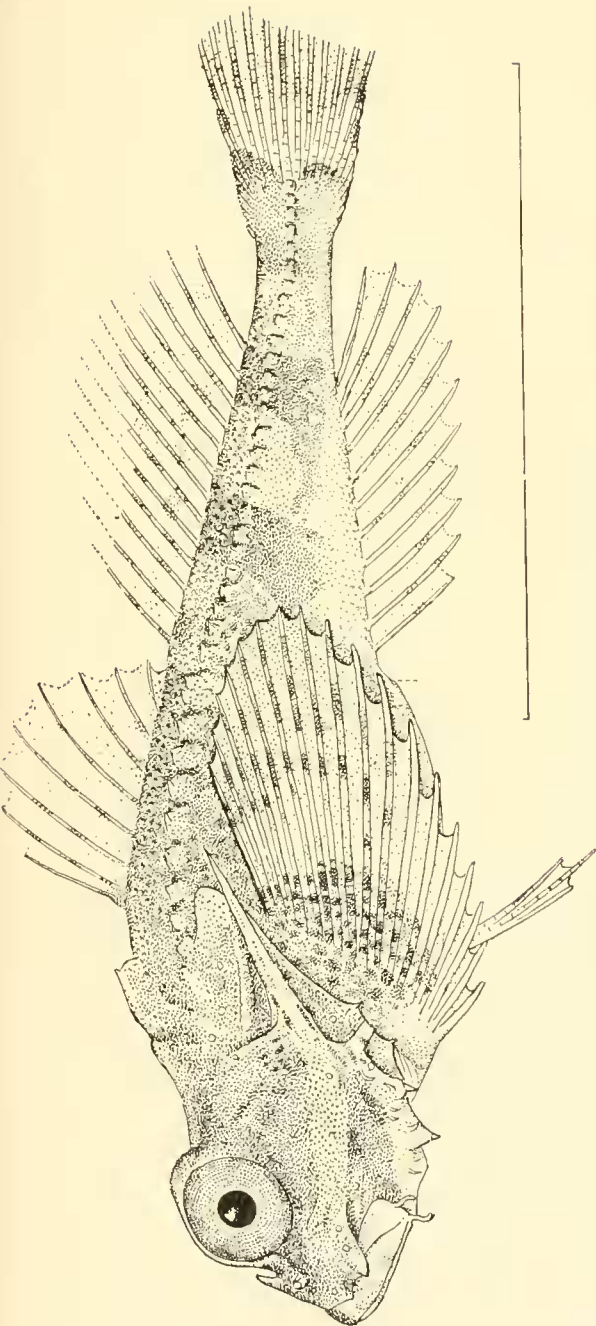
maxillary to posterior margin of orbit rather narrow, its width at end about 1.5 in orbit; mouth oblique, the upper edge of premaxillary below level of lower margin of orbit; teeth in jaws in broad villiform bands, the band of lower jaw a trifle broader behind, that in upper jaw widening in front, terminating on each side of the symphysis as a rounded lobe, a narrow mesial toothless ridge in each jaw; teeth of both jaws immovable, pointing inward; vomer with a broad V-shaped band of teeth, the arms of the V rounded; no teeth on palatines; lower jaw included, its band of teeth shutting inside those of the upper jaw; premaxillary separated from maxillary by a deep furrow; upper lip a narrow continuous ridge, followed by a high ridge of skin, which usually lies back toward the maxillary; lower lip a high thin fold at the sides, growing thicker in front and interrupted mesially by a broad frenum; a rather prominent, rounded knob at symphysis of lower jaw.

Gill-membrane forming a rather thick but shallow fold across the isthmus; gills 4, the slit behind the fourth represented by a very small pore on the left side, on the right no opening evident; gillrakers represented by broad, low, rounded tubercles, which are very hispid and rough to the touch, like shagreen; head with a few spines and various ridges; nasal spines short, stout, sharp, pointing backward, the distance between them about two-thirds orbit; supraocular ridge beginning as a large raised area in front of eye, continued backward as a blunt high ridge, widening posteriorly and terminating in a rather high rough postocular tubercle which ends abruptly; at the base of this, two diverging short ridges between which rise the prominent supraoccipital ridges, these converging backward to the base of the occiput, where each ends in a raised elongate very rough tubercle much like those behind the eye; a broad, diverging, smooth, blade-shaped ridge extending from the supraoccipital tubercles nearly to upper angle of gill-slit, and from the posterior end of this ridge, rising at a sudden angle, a posteriorly projecting ridge which ends in the stout, short, scapular spine; a long low ridge below the eye, and another back and behind eye, pointing downward; suborbital stay prominent, running backward nearly to the base of the upper preopercular spine; a high broken ethmoidal ridge running across upper part of cheek, extending from behind eye toward top of gill-slit, and a prominent ridge from a break in its center toward the base of the upper preopercular spine.

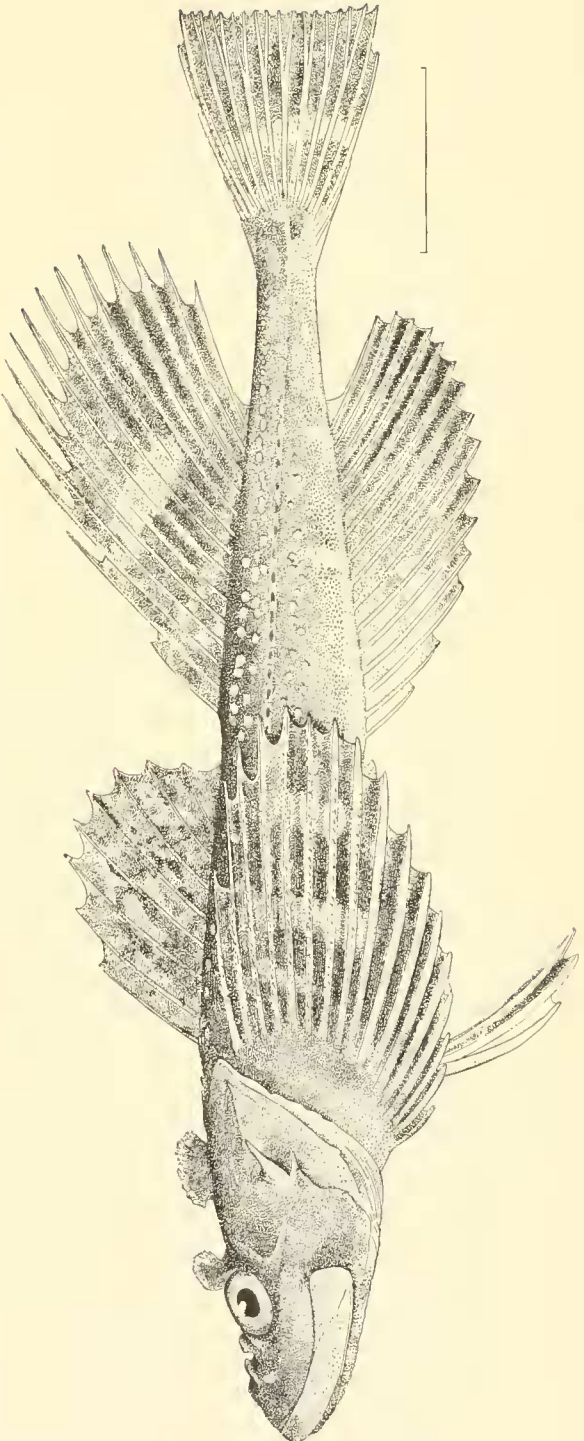
Preopercular spines 4, the upper stout, about as long as orbit, straight, pointing outward and backward, covered nearly to the tip with skin, which is warty or rough papillose at its base; second spine not quite half so long, pointing downward and outward; third spine a prominent tubercle; fourth; stout, sharp, pointing downward and forward, rather remote from the others; opercular spine short and sharp, nearly covered with skin, terminating a long, prominent, striate, rather curved ridge, which is parallel with the upper edge of the opercular flap; opercular flap long, rather thin, extending upward and backward and beyond the spine for a distance nearly equal to diameter of orbit.

Spinous dorsal high, its general contour rounded, its membrane roundly scalloped between the spines, spines long, slender and sharp, the longest (fourth) 3.75 in head, the two spines in front closely approximated, the others rather remote (distance about one-half orbit), the posterior spines shortest, origin of dorsal above suprascapular spine; base 2.25 in head, nearly equal to snout and orbit; interval between spinous and soft dorsal conspicuous, about two-thirds orbit; base of soft dorsal 1.9 in head, its rays long, stout, conspicuously ringed, none of them branched, a few of the anterior shorter, the contour of the fin gently rounded in front and behind, the median portion straight, the margin gently scalloped, the rays not produced, longest rays nearly equal to snout; anal similar in outline to soft dorsal, its membrane, however, considerably thicker, the rays firmer and stouter, ending in rather stout tips; origin of anal below fourth anal ray, anal base equal to a distance from tip of snout to posterior margin of orbit; pectoral very broad, the base procurvent, close to and parallel with the edge of the gill-opening, nearly all the rays, especially the lower, very thick and stout, almost club-shaped and projecting slightly as blunt points beyond the membrane, the lowest very short, gradually lengthening to the first from the uppermost, the uppermost a trifle shorter than second; the three upper rays somewhat slender, displaying the articulations, the others not; longest ray (second) equal to distance from tip of snout to a little beyond posterior margin of orbit, the tip of the fin reaching to end of base of first dorsal but not quite reaching vent; ventral rays and membrane exceedingly thick, the inner ray somewhat the longer, the fin somewhat acute, the greatest length equal to length of snout, the tips reaching about half-way to vent from their base; caudal truncate, fan-shaped, the tips of the forked rays extending beyond tips of membrane as closely approximated points, two near together; peritoneum dusky.

No scales, nearly all of upper part of head as well as tip of maxillary covered with minute wartlike elevations, the lower part of the cheek and a patch above suborbital stay and backward and downward



1. ENOPHRY CLAVIGER (CUVIER & VALENCIENNES).



2. ONCOCOTTUS HEXACORNIS (RICHARDSON).

from the eye smooth; a patch of minute tubercles along each side of suborbital stay; warts on opercle above opercular ridge minute and collected into patches; below this ridge they are round and flat, collected somewhat into chainlike bands, small patches of minute tubercles extending backward and away from each segment of the lateral line, giving it a somewhat feathery appearance; a line of these small projections terminates the lateral line at the base of the caudal fin; lateral line chainlike, of about 47 jointlike segments.

Color in alcohol dark brown above, much mottled with irregular, small, thickly set white blotches, this color extending up somewhat on the base of the fin membranes; lower half of side paler, consisting of a white ground clouded over with minute brown punctulations; ventral surface, including chin and breast, white; upper lip, maxillary, and membranes of upper jaw slaty blue; dorsal fins irregularly blotched with patches of white and dark brown, the margin of each fin, particularly the soft dorsal, inclined to be wholly white; caudal membranes light at base, the rays dark, this dark color broadening outwardly, making a dark brown band parallel with the edge of the fin, its distal border slightly wavy, its proximal border deeply incised by sharp patches of white projecting out between the rays, the outer margin of the fin wholly white; anal white with 3 dark vertical bars about half as wide as eye, these about equal distances apart, the projecting tips of the rays always white; ventrals pale, mostly cloudy, crossed with indistinct bars of lighter; pectorals dark brown, a few round small spots of white arranged roughly in the form of bars; a narrow margin of the fin wholly white, the upper edge of the fin showing brown regularly crossed by small white dots.

Specimen described a female containing a few small eggs.

This fish has a close general resemblance to *Myoxocephalus polyacanthocephalus*. The presence of a fourth preopercular spine, however, removes it from that genus. The character of the gill slit resembles that of *Myoxocephalus*, but the fourth preopercular spine and other minor characters place it better with *Oncocottus*. Our specimen possesses many characters common to both genera, however, and it may be found that characters which have been considered generic in small individuals disappear in larger ones. The gill slit, for instance, is present on one side and absent on the other in this specimen.

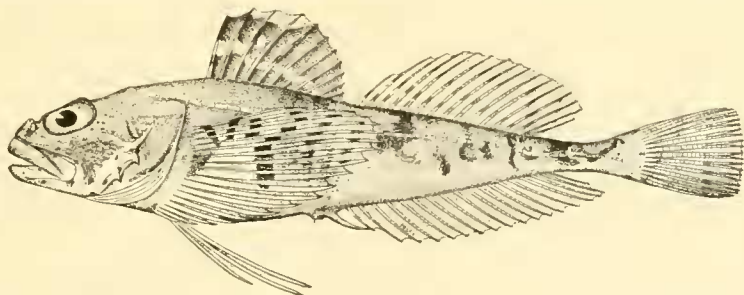


FIG. 79.—*Gymnocanthus pistilliger* (Pallas)

149. *Gymnocanthus pistilliger* (Pallas).

We have in the collection a specimen 5 inches long, collected at Tarenski Harbor, Kamchatka, June 21, 1900. This species has also been recorded by Bean (1882) from Kyska Harbor and Point Belcher. Gilbert (1895), Bristol Bay at stations 3230 to 3233, 3237 to 3246, 3289, 3291, 3296, and 3300. Seofield (1899), Port Clarence.

150. *Gymnocanthus galeatus* Bean.

Head 3 in length; depth 6; eye 3.6 in head; dorsal xi-16; anal 18; pectoral 19; maxillary 2.4; interorbital 3.1.

The collection contains 25 specimens 1.5 to 11.5 inches long from the following places: Atka Island, 1894; stations 3598, in Bering Sea, and 3653, off Shana, Iturup Island; Akutan Bay; station 4253, Stephens Passage, and with hook and line in Shakan Bay. The specimen (no. 2913) from station 4253 is a female with very small eggs.

Originally described by Bean (1882) from Hiuliuk, Unalaska, and also recorded by him from off Cape Sabine, Arctic Ocean, and from Steamer Bay, Chacau, and Sitka. Chernofski Harbor, Unalaska Island (Gilbert 1895). Port Clarence (Townsend 1887). Point Barrow (Scofield 1899). St. Paul Island (Palmer).

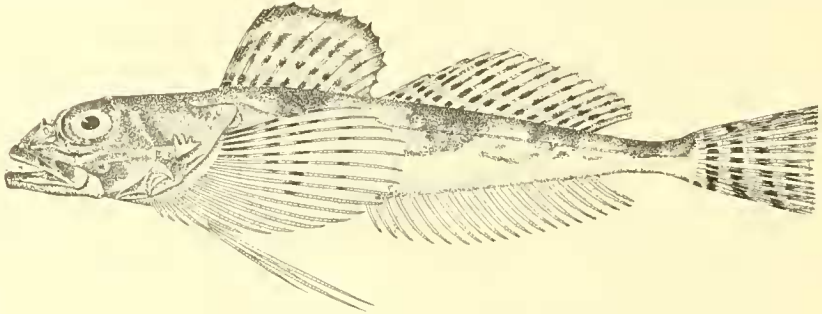


FIG. 80.—*Gymnocanthus galeatus* Bean.

151. *Leptocottus armatus* Girard.

The collection contains 52 specimens 1.75 to 12 inches long from the following places: Karluk; Gabriola Island; Union Bay; Marrowstone Point; Kilisut Harbor; Mink Arm; Yes Bay; Dundas Bay; Snug Harbor; Yakutat; Hunter Bay; Loring; and Promise Island. Specimens were also seen at Dundas Bay; Nanaimo; Fort Rupert; Metlakatla; Boca de Quadra; Karta Bay; Sucia Island; Seattle; and Alert Bay. A specimen (no. 2792) 8.75 inches long, gives the following data: Head 2.8 in body; depth 4.75; eye 6 in head; interorbital 5.5; maxillary 2.1; dorsal viii-17; anal 19; pectoral 18.

The young are exceedingly mottled, and usually with 2 very small white spots on shoulder which disappear with age.

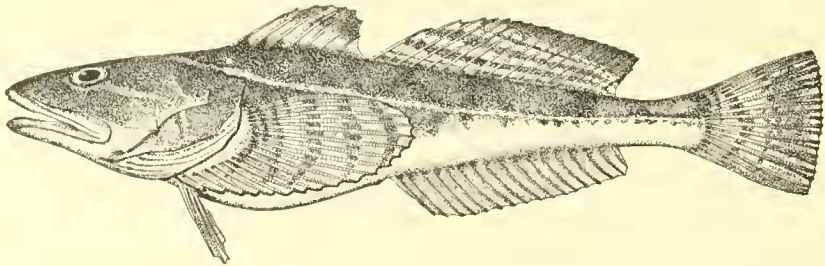


FIG. 81.—*Leptocottus armatus* Girard.

A specimen 1.5 inches long collected at Promise Island, October 3, 1894, is the smallest specimen we have. It differs somewhat from mature specimens in color, having 3 dark saddle-like crossbars, the first under anterior part of spinous dorsal; second under anterior part and third under posterior part of soft dorsal. Mature specimens can usually be readily recognized by the palmate appearance of the proopercular spines; in successively smaller specimens these gradually become more pinnate. The species is recorded by Bean (1882) from Sitka; Port Mulgrave, Yakutat Bay; and St. Paul, Kodiak Island. Rutter (1899), Karluk.

152. *Oligocottus maculosus* Girard.

The collection contains 13 specimens from Otter Bay, Pendar Island, 1895; 13 specimens from Kilisut Harbor, 108 from Marrowstone Point, 88 from Gabriola Island, 54 from Fort Rupert, 15 from Shakan Bay, and 16 from Point Ellis; no. 2225, a specimen 3 inches long, and 203 specimens collected

by Mr. Rutter at Karluk in 1903; 19 specimens collected in 1903 in Naha Bay by Mr. Chamberlain, who also collected 2 specimens in Yes Bay in 1905.

This species has been recorded (Bean 1882) from Sitka; Alexandrovsk, Cook Inlet; Wrangell; Mary Island and Tongass (Bean 1884), and Karluk (Rutter 1899).



FIG. 82.—*Oligocottus maculosus* Girard.

153. *Sigmistes caulias* Rutter.

Originally described by Rutter (1899) from Karluk.

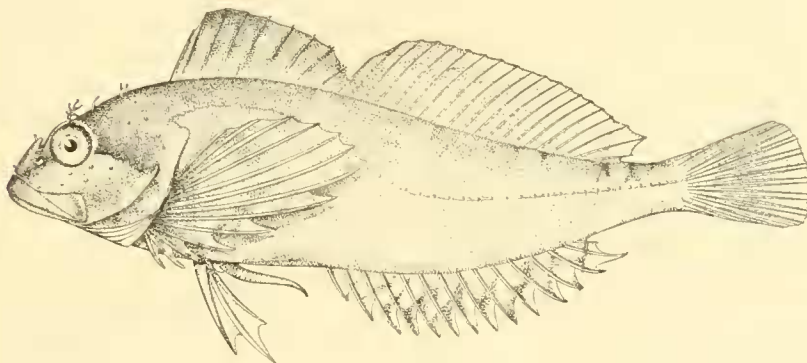


FIG. 83.—*Sigmistes caulias* Rutter. Type.

154. *Blennicottus acuticeps* (Gilbert).

Head 3.75 in length; depth 5; eye 3.9 in head; snout 4; maxillary 2.5; mandible 2; dorsal viii-15; anal 11; pectoral 13; ventral 1, 3; branchiostegals 6.

Body rather elongate, the dorsal contour arched under the spinous dorsal, tapering behind to a slender caudal peduncle, the least depth of which equals eye; head rather small, its upper profile arched; mouth small, horizontal, maxillary reaching to anterior margin of orbit; teeth in villiform bands on jaws, vomer, and palatines; interorbital rather narrow, concave; snout rather sharp and pointed; nasal spines present, rather strong; one pair of supraorbital and two pairs of occipital cirri, these rather long; preopercle with only one (the upper) spine present, this covered with skin—when exposed it is seen to be rather sharp and stout, curved upward; gill-membranes forming a broad fold across isthmus; no evident slit behind last gill-arch; a rather strong suprascapular spine; spinous dorsal rather high, of uniform height, the slender spines (3 in head) united to their tips by the thin transparent membrane, the base of spinous dorsal a trifle longer than head; soft dorsal somewhat lower, its rays longer than spines, 2.1 in head, but slanting backward when fin is extended; base of soft dorsal 2.75 in head; the anal about the same length; pectoral long, graduated, the lowest rays short and stout, free at the ends and hooked, the fin extending beyond origin of anal, nearly as long as head; ventral 1.5 in head, rather long and narrow, extending beyond vent and nearly to base of anal; caudal somewhat narrow, rounded, its length 1.2 in head.

Color in alcohol slaty blue above, gradually fading to dusky white below; a dusky patch at front edge of dorsal; anal and lower rays of caudal speckled; pectorals dusky; ventrals and soft dorsal plain.

The collection contains 227 specimens varying from 1.5 to 2.5 inches. Two of these were collected by the *Albatross* in 1894, one in Promise Bay and the other at Atka Island. One is a female containing mature eggs the size of mustard seed. The other specimens were collected by Mr. Rutter on the beach at Karluk, June 8-10, 1903.

The following counts of 159 specimens collected at Karluk show the variations in the anal rays: Seven have 13 anal rays, 106 have 12 anal rays, 45 have 11 anal rays, and 1 has 10 anal rays.

These also show great variation in color and in markings, the ground color varying from plain olivaceous to rosy, and some being almost plain, others much speckled and mottled. In all these specimens the 2 black blotches on spinous dorsal are present, but they vary in size and distinctness. In many the tips of the spines project slightly as minute filaments, and the fin is not evenly rounded, being higher in front. In *embryum* the fin is not so high, but is rounded, being higher in the center. This species can not be separated from *B. embryum* on the number of the anal rays, as both frequently have 11, *embryum* usually having 10 or 11 and *acuticeps* varying from 10 to 13.

Described by Gilbert (1893) as *Oligocottus acuticeps*, from Unalaska. Recorded by Rutter (1899), as *Orycottus acuticeps*, from Karluk.

155. *Blennicottus globiceps* (Girard).

Recorded by Bean (1881) as *Oligocottus globiceps*, from the following places: Sitka; Shahafka Cove, Kodiak Island; Adak and Amchitka.

156. *Blennicottus embryum* (Jordan & Starks).

Three specimens (nos. 02224 and 02227), each about 1.75 inches long, collected by Mr. Rutter at Karluk early in July; and 64 specimens 1 to 2.75 inches long, collected by him at Karluk, June 8-10, 1903.

Head 3.33 in length; depth 4.8; eye 3.2 in head; snout 3; maxillary 2.5; mandible 3; interorbital 1.25; dorsal ix, 15; anal 10; branchiostegals 6; pectoral 14; ventral i, 4; pores about 34 (?).

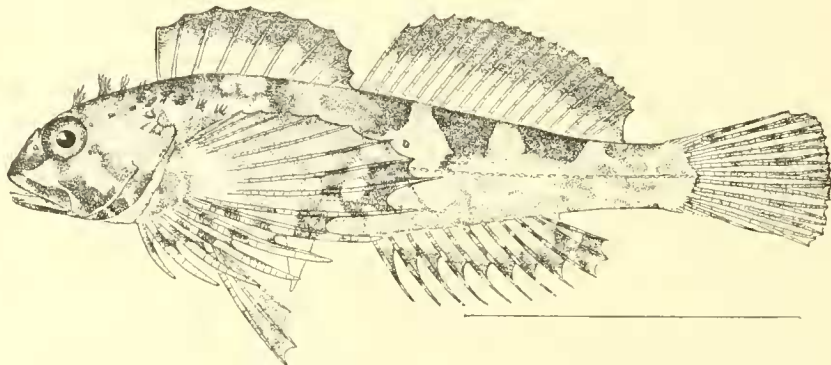


FIG. 84. — *Blennicottus embryum* (Jordan & Starks). Type.

Body somewhat elongate, tapering to a rather slender caudal peduncle, the depth of which is somewhat more than diameter of orbit; head rather small, compressed, the profile rounded; mouth horizontal, quite small; tip of maxillary reaching slightly beyond anterior margin of orbit; teeth minute, on jaws, vomer, and palatines; nasal spines rather stout; interorbital space rather narrow, concave; apparently no slit behind last gill-opening; preopercular spine single, covered with skin; when dissected out, it is seen to be simple, short, stout, sharp, and slightly curved upward. Spinous dorsal rather low, rounded, its longest spine about 3 in head, its base about equal to head; longest dorsal ray about 1.6 in head; base of soft dorsal about 2.66 in body; pectoral rather broad, acute, about 1.5 times head and extending beyond origin of anal; ventrals long and slender, 1.3 in head, reaching beyond vent nearly to anal; anal papilla prominent in the male.

Color in alcohol: Six saddle-shaped blackish blotches along dorsal, reaching about to lateral line, pale roundish spots between these; lower part of body and all fins but ventrals finely mottled.

157. *Blennicottus clarki* Evermann & Goldsborough, new species.

Head 2.75 in length; depth 5.5; eye 3.3 in head; snout 4.3; dorsal vi-12; anal 12; pectoral 21; ventral 1, 3; branchiostegals 6.

Body elongate, slightly compressed, tapering gradually from occiput to narrow caudal peduncle, the least depth of caudal peduncle 1.5 in eye and 2 in its length; vent median, much nearer base of anal than base of ventral.

Head rather large, somewhat depressed; snout bluntly rounded from above, its anterior profile gently rounded; mouth horizontal, tip of premaxillary below lower margin of orbit, maxillary reaching vertical at middle of pupil; teeth minute on jaws, those on vomer and palatines barely discernible; nasal spine short, sharp, and weak; interorbital very narrow, not evidently concave, about 4 in eye; occiput with 2 faint ridges, area between them somewhat concave; opercle thickened above, ending behind

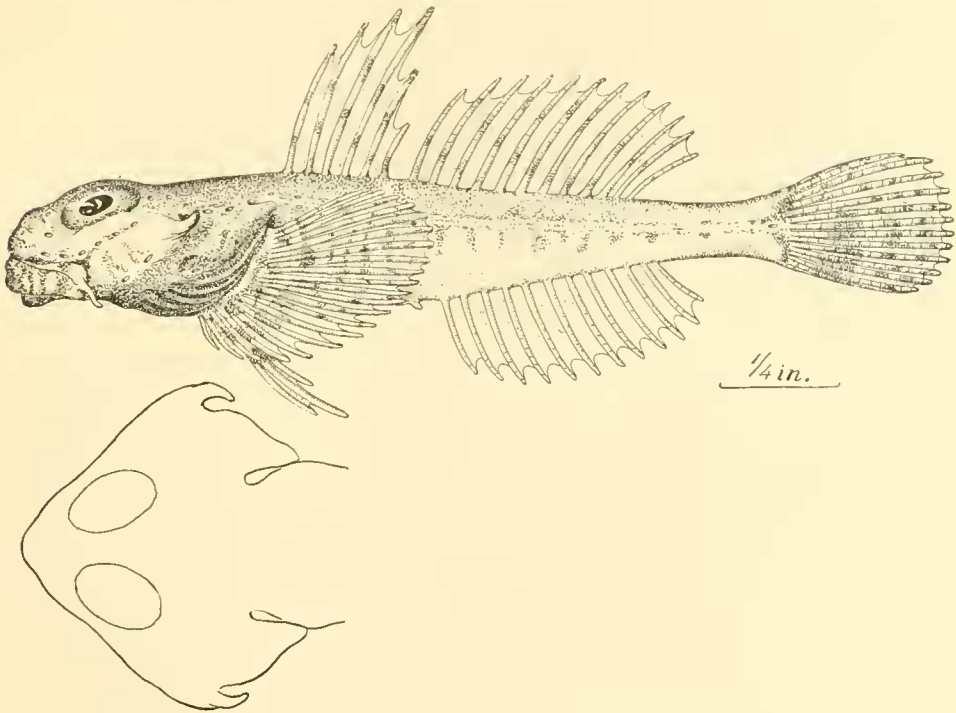


FIG. 85.—*Blennicottus clarki* Evermann & Goldsborough, new species. Type.

in a round lobe; 2 preopercular spines, the upper simple, stout, curving upward and inward, covered with membrane, the lower, on lower limb of preopercle, short, directed downward and forward; no evident nasal cirri, and none evident on lateral line; a strong cirrus on tip of maxillary, a small one near base of upper preopercular spine, and a small one on opercular flap, one on shoulder above base of pectoral, rest of body smooth without further cirri or other prickles.

Origin of dorsal over upper base of pectoral, spines rather high, second, third, and fourth highest, about 1.4 in head, free at tip, the tips slightly club-shaped; interval between spines very short; soft dorsal nearly as high as spinous dorsal, the middle rays highest, about 2 in head; caudal rounded, long and narrow, 1.3 in head; anal similar to soft dorsal; ventrals long and narrow, reaching nearly to vent, 2 in head; pectoral broad and falcate, upper rays longest, reaching beyond origin of anal, its base strongly procurvent, parallel with gill-cleft and close behind it, length from lower edge of axil to tip about 1.1 in head.

Color in alcohol brownish-olivaceous on upper part of side, mottled with small white spots; occipital and interorbital region darkest, region above lateral line light olivaceous; an indistinct darker bar

under spinous and a similar one under middle of soft dorsal, a dark blotch at base of caudal; dorsal, caudal, and pectoral indistinctly blotched and mottled with brown, these tending to form bands; a dark area at base of pectoral; anal and ventral plain.

This species is most closely related to *Blennicottus acuticeps*, from which it differs markedly in having a blunter snout, narrower interorbital, larger head and eye; fewer dorsal spines and rays; no nasal cirri and none on lateral line.

Type no. 57824 U. S. National Museum, a specimen 2 inches long, collected by the *Albatross* at station 3598, Bering Sea, June 8, 1894. We have 1 other specimen, 1.2 inches long, from same place.

Named for our friend and associate, Mr. H. Walton Clark, of the Bureau of Fisheries, in recognition of his valuable assistance in the preparation of this report.

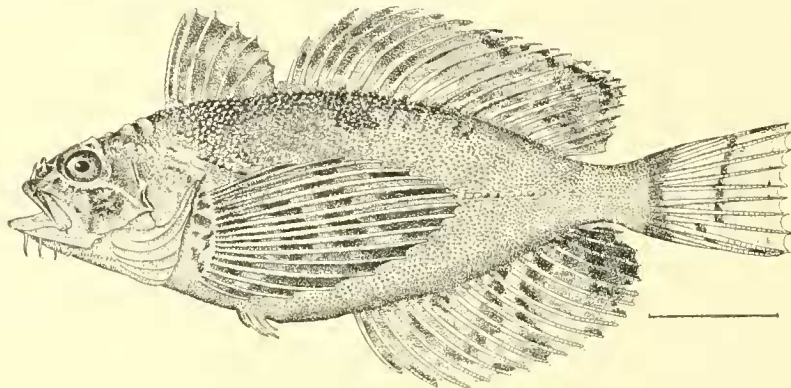


FIG. 56.—*Histiocottus bilobus* (Cuvier & Valenciennes).

158. *Histiocottus bilobus* (Cuvier & Valenciennes).

We have 4 specimens 9 to 10 inches long from Karluk; 1 specimen 6 inches long from station 4259; and another 6 inches long, Tongass Narrows, October 28, 1905. It is recorded by Bean from St. Paul, Kodiak, as *Blepsias bilobus*.

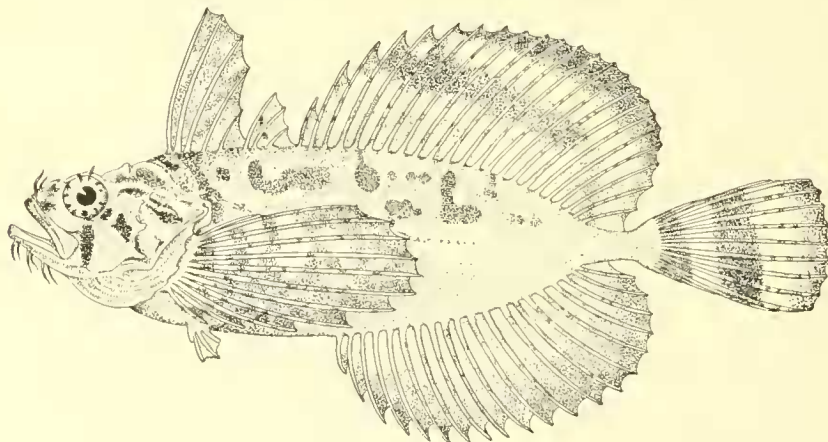


FIG. 57.—*Blepsias cirrhosus* (Pallas).

159. *Blepsias cirrhosus* (Pallas).

Ninety-five specimens of this species were taken at various points from Puget Sound to Kodiak Island. They range in length from 1.25 to 7.5 inches and were taken at the following places: Marrowstone Point; Kilisut Harbor; Fox Bay; Alert Bay; Cleveland Passage; Metlakatla; Killisnoo, and on the beach at Karluk. A female 6 inches long, seined at Marrowstone Point June 29, was ripe with

eggs of good size (larger than shad eggs) and of bright rosin color. Fifty-six of the specimens were taken at Karluk by Mr. Rutter. These were 1.25 to 1.8 inches long, and the dorsal counts in many of them were iv, iii-24; the young have a distinct color pattern, showing the pale blotches on fins very distinctly. These blotches are not so distinct on larger examples, indicating that the young are much more brilliantly colored.

Recorded by Bean (1882) from Sitka; Port Mulgrave, Yakutat Bay; Hiulink and Chernofski, Unalaska; Bay of Islands, Adak; Kyska, and St. Paul Island. Gilbert (1895), Unalaska.

160. *Nautiscus pribilovius* Jordan & Gilbert.

Recorded by Bean (1882) from Unalaska, Adak, Kyska, and St. Paul, Kodiak Island, as *Nautichthys oculofasciatus*; under the same name by Gilbert (1895) from Bristol Bay and south of the Alaskan Peninsula at stations 3213, 3217, 3220, 3222, 3231, to 3234, 3236, 3246, 3274, 3281, 3290 to 3294, 3296, 3300, and 3302. The species was described by Jordan & Gilbert in 1899, the type coming from St. George Island and a cotype from Unalaska.

161. *Nautichthys oculofasciatus* (Girard).

One specimen 4 inches long from station 4209, Admiralty Inlet; 1 specimen 4.3 inches long from station 4219, mouth of Oak Bay.

162. *Ulca marmorata* (Bean).

A specimen (no. 2917) 12.5 inches long from station 4255, Chilkoot Inlet, is described as follows:

Head 2.6 in length; depth 5; eye 5.5 in head; snout 4; maxillary 1.5; mandible 1.28; interorbital 2.5; length of middle pectoral rays 1.5; second dorsal spine, including filament, 2.5; longest dorsal ray 2.6; caudal 2; longest anal rays 2.7; ventrals 3.1.

Head very broad, depressed, the body tapering gradually to the slender caudal peduncle; mouth large, oblique, the maxillary extending beyond pupil; the mandible strongly projecting; teeth very strong on jaws, vomer, palatines, premaxillaries, and tongue, many of them enlarged and canine-like; head very rough, with numerous large bluntish spines, those on supraocular and occiput largest and strongest; one large blunt spine at upper angle of opercle followed by a long curved ridge; preopercle with 4 blunt diverging spines, the second one from top longest; opercle with a strong ridge; interorbital very broad and concave; body everywhere, especially above, covered with low blunt tubercles; under parts with soft tubercles; lower jaw with numerous cirri, some of them branched, nearly equaling eye in length; numerous smaller cirri on upper part of head and anterior part of body. Fins well developed, dorsal spines long, ending in filaments; soft dorsal higher than spinous portion; anal rays somewhat enlarged; pectoral very large, nearly reaching beginning of anal.

Besides this large specimen the collection contains 4 smaller ones, as follows: One 1.8 inches long, dredged at station 4270, Litnik Bay; one 2.25 inches long, dredged at station 4281, Chignik Bay; one 2.6 inches long, dredged at station 4279, Alitak Bay; one 3 inches long dredged at station 4293.

Originally described by Bean (1891), as *Hemitripterus marmoratus*, from Albatross station 2855, off Sitkalidak Island. Recorded by Gilbert (1895) under the same name from stations 3224, 3257, 3258, and 3311 in Bering Sea, north of Unalaska Island.

163. *Hemitripterus cavifrons* Lockington.

We have in the collection a single specimen 8.5 inches long, collected by the *Albatross* at Petropolski, June 20, 1903. Recorded by Bean (1882) from Kodiak as *Hemitripterus americanus*.

164. *Synchirus gilli* Bean.

One specimen 1.5 inches long picked off an anemone at Quarantine Dock, Port Townsend, June 27, 1903.

Dorsal 1x-20; anal 20. No spiny tubercles on lateral line; no series of spiny scales along dorsal base.

165. *Psychrolutes paradoxus* Günther.

Eighty-seven specimens, from 0.75 to 2.4 inches long, were secured by the *Albatross* in Otter Bay, May 31, 1895, and at stations 4223, 4228, 4257, 4270, 4271, 4273, 4274, 4275, 4283, 4285, 4290, 4291. These stations range from Puget Sound to Kodiak Island.

Recorded by Bean (1882) from Kodiak Island. Gilbert (1895), as *Psychrolutes zebra*, from stations 3213, 3215, to 3217, 3219, 3222, to 3225, 3257 to 3259, 3263, 3265, 3272, 3310, 3311, 3313, 3322, 3334, in shallow water south of the Alaskan Peninsula, thence west to and through Unimak Pass, along the northern shore of Unalaska Island and in Bristol Bay. Under the same name by Bean (1891) from station 2848, between Unga and Nagai islands. Jordan & Gilbert (1899), stations 3640 off St. Paul Island and 3674 off Kodiak Island at Karluk.

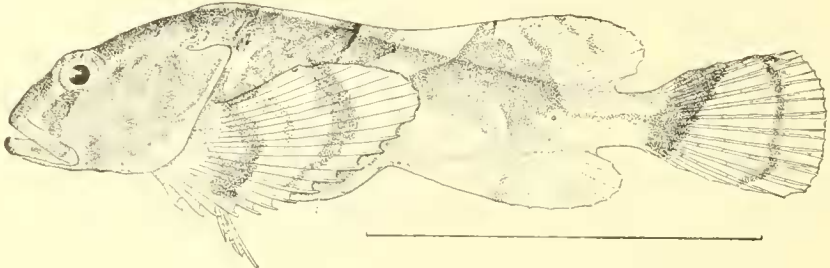


FIG. 88.—*Psychrolutes paradoxus* Günther.

166. *Gilbertidia sigolutes* (Jordan & Starks).

Head 2.7 in length; depth 3; eye 4.7 in head, equaling snout; interorbital 2; width of mouth 2; dorsal vi, 21; anal 15; pectoral 15; ventral 3.

Body short and tadpole-like, tapering rapidly from the very large head to the narrow caudal peduncle; head very large, globular; snout short and evenly rounded; interorbital very broad, gently convex; mouth large, broad, jaws subequal; maxillary slender, weak, reaching front of eye; teeth in jaws weak, apparently in a single row; vomer and palatines toothless. Dorsal fin much larger than anal, partly concealed by loose skin; spinous dorsal entirely obliterated except the tips of the last 3

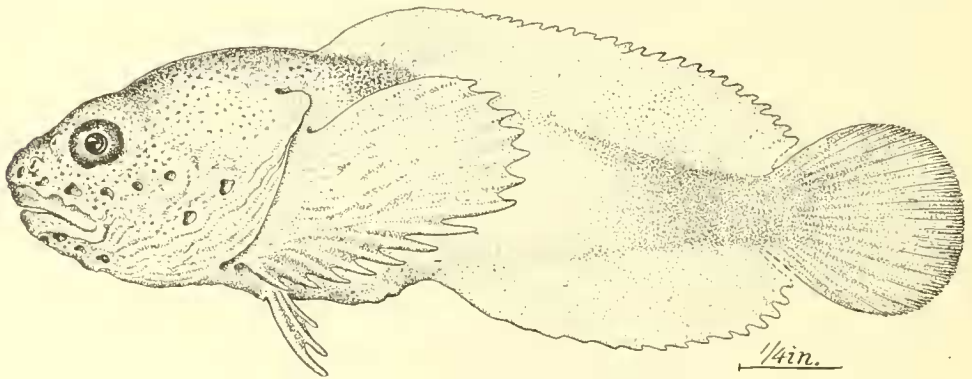


FIG. 89.—*Gilbertidia sigolutes* (Jordan & Starks).

spines, which project above the skin as mere tubercles; origin of anal nearly under fourth dorsal ray; tips of last dorsal and anal rays overlapping base of caudal fin; caudal fin evenly rounded; pectoral well developed, its upper rays longest, reaching origin of anal fin, the lower rays somewhat enlarged, their tips free; ventrals small, short, barely reaching vent; nostrils with conspicuous nasal flaps; lower jaw, side of head, and side of body above pectoral fin with conspicuous mucous pores.

Color in alcohol, brownish white; the back in front of dorsal crossed by a broad bluish band; region under pectorals and ventrals bluish; head everywhere above finely punctate with brownish; under part of head whitish; fins all plain bluish white.

One specimen, 2.5 inches long, was dredged at station 4256, in 73 fathoms, in Chilkoot Inlet, July 16, 1903, and a specimen $1\frac{1}{8}$ inches long, at station 4257, off Funtler Bay. Two specimens, each about 1.5 inches long, were seined at Loring, April 25, 1903, by Mr. Chamberlain.

Family 34. RHAMPHOCOTTIDÆ.

167. *Rhamphocottus richardsoni* Günther.

The collection contains the following specimens:

Two collected by the *Albatross* in Straits of Fuca (1891); 2 seined at mouth of Hood Canal; 5 from stations 4197, 4204, 4205, 4209, 4212. These differ from current descriptions in that the tubercles are simple and prickly, but not bifid or trifid. Dorsal spines not always VII, sometimes VIII, and in one case VII n; first pectoral rays and the dorsal rays prickly for their whole length; black spot not always present on all the dorsal rays. There are numerous tubercles on upper half of membrane of eye.

This species was recorded from St. Paul, Kodiak Island, by Bean (1882).

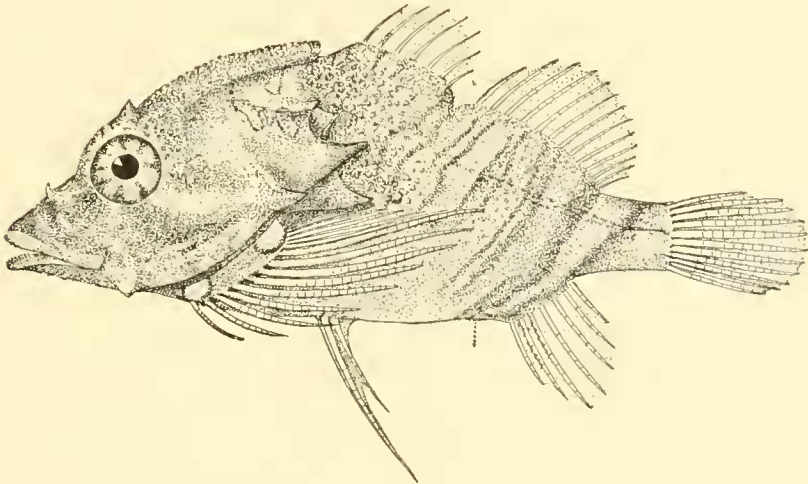


FIG. 90.—*Rhamphocottus richardsoni* Günther.

Family 35. AGONIDÆ. The Sea-Poachers.

168. *Hypsagonus quadricornis* (Cuvier & Valenciennes).

Specimens from 1.5 to 2 inches long were taken in 1903 at the following *Albatross* stations: 4204, 4205-7, 4212, 4268, 4284, one specimen being taken at each station. The species was also seen at Fort Rupert and Admiralty Inlet.

Recorded by Gilbert (1895) from north and south of the Aleutian Islands and in Bristol Bay at stations 3213, 3214, 3217, 3220, 3223, 3224, 3262, and 3322.

169. *Occa dodecaedron* (Tilesius).

Recorded by Nelson (1887) from Unalaklik and by Gilbert (1895), as *Brachyopsis dodecaedrus*, from Bristol Bay at stations 3239, 3240, 3242, and 3248.

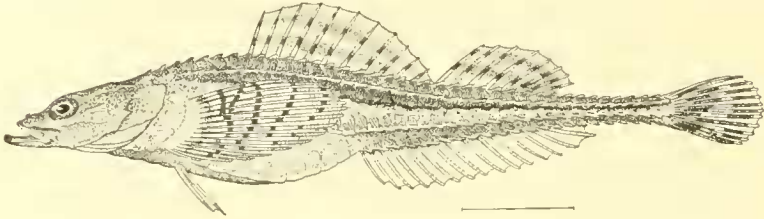


FIG. 91.—*Occa dodecaedron* (Tilesius).

170. *Pallasina barbata* (Steindachner).

Twelve specimens, 2.25 to 4 inches long, seined in Funter Bay; one, 4.75 inches long, seined in Kilisnoo Harbor; two, 3.8 and 5 inches long, seined in Cleveland Passage; all collected by the *Albatross* in 1903.

These specimens might just as well be called *P. aix*, except for the 3 or more rows of plates (sometimes 2) on median line in front of ventrals. *P. aix* is said to have but 2 and the neighboring plates small. These specimens have 2 or 3, and the other plates small or large. The barbel is short, in *barbata* it should be long.

Recorded as *Siphonops barbata* (Bean 1882) from Port Mulgrave, Yakutat Bay; Unalaska; Port Clarence. *Albatross* stations 3239, 3240, 3242 to 3245, and 3258, all in Bristol Bay (Gilbert 1893). Iliuliuk, Unalaska (Turner 1886). Port Clarence (Scofield 1897).

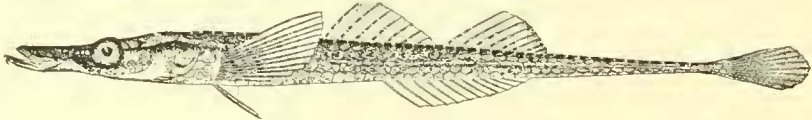


FIG. 92.—*Pallasina barbata* (Steindachner).

171. *Pallasina aix* Starks.

Recorded from Chignik Bay (Scofield 1899).

172. *Podothecus acipenserinus* (Tilesius).

Thirteen specimens, 2 to 5.5 inches, no label, but probably from Alaska: ten, 3 to 8.5 inches long, collected by the *Albatross* at stations 3598, 3600, and at Port Ludlow; twenty-five, 4.5 to 8 inches long, collected by the *Albatross* in 1903 at stations 4270 to 4272, 4276, and 4296; also at Marrowstone Point, and seined at Quarantine Station; one specimen taken at Yes Bay by the *Albatross* in 1905.

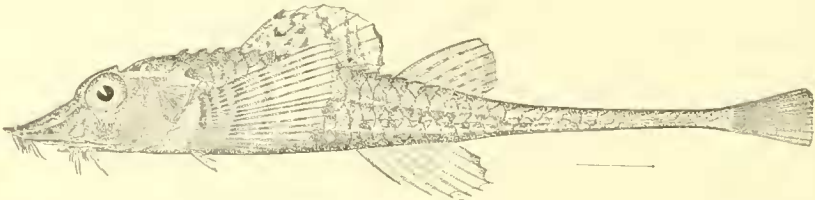


FIG. 93.—*Podothecus acipenserinus* (Tilesius).

In most of the specimens the plates on caudal peduncle have spines, which is contrary to current descriptions. The color also is different in our specimens; in most of them the black streaks between plates are absent; the 3 black bars on caudal peduncle and the one under anterior part of soft dorsal are not noted in current descriptions.

Originally described by Tilesius from Unalaska. Recorded by Bean (1882) from St. Paul, Kodiak Island; Unalaska; Cape Lisburne; Arctic Ocean. From many stations (44) around the Aleutian Islands and in Bristol Bay by Gilbert (1895). From St. Paul Island by Townsend (1887).

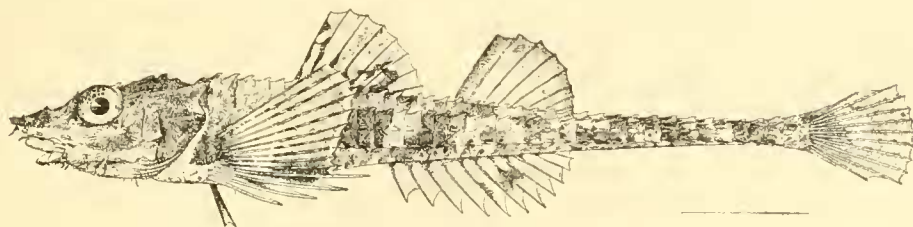


FIG. 94.—*Aurruncus emmelane* Jordan & Starks.

173. *Aurruncus emmelane* Jordan & Starks.

One specimen, 6.25 inches long, dredged at station 4222, mouth of Hood Canal. Only 2 other specimens known. They were taken in a seine near Port Orchard, Puget Sound, by E. C. Starks.

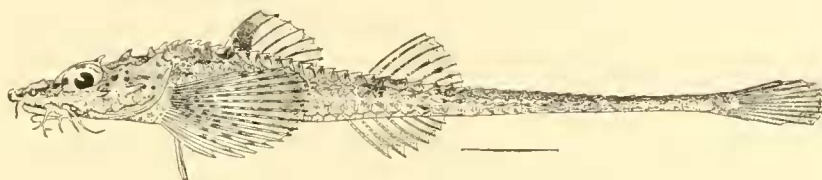


FIG. 95.—*Sarritor frenatus* Gilbert.

174. *Sarritor frenatus* Gilbert.

Six specimens, 2.5 to 10.5 inches long, collected by the *Albatross* at stations 3598, 3599, 4290, and 4292. Originally described by Gilbert (1895) as *Odontopyx frenatus* from Albatross stations 3219, 3225 to 3227, 3255 to 3258, 3263, 3269, 3279, 3282, 3309, 3311, 3313, and 3330, located on both sides of the Alaskan Peninsula and both north and south of the Aleutian Chain.

175. *Sarritor leptorhynchus* (Gilbert).

Seven specimens, 3.25 to 4.5 inches long, were dredged at stations 4268, 4279, 4283, 4285, and 4286. Originally described by Gilbert (1895) from north and south of the Alaskan Peninsula at stations 3215, 3219, 3222, 3229, 3259, 3265, and 3267.



FIG. 96. *Bathygonus nigripinnis* Gilbert

176. *Bathygonus nigripinnis* Gilbert.

The collection contains 36 specimens, 2.25 to 8 inches long, dredged by the *Albatross* in 1903 at stations 4191, 4198, 4231, 4235, 4236, 4238, 4240, 4241, 4250 to 4252, 4258, and 4266. The species was originally described by Gilbert (1895) from north and south of Unalaska at stations 3210, 3316, 3324, 3325, 3329 to 3332, and 3337.

177. *Xenochirus pentacanthus* Gilbert.

This species is very generally distributed from Puget Sound to Bering Sea. It was never taken abundantly, but was found at a great many different places, 71 specimens, from 1.6 to 4.65 inches long, being taken at stations 3547 (Bering Sea), 3597, 4193, 4221, 4223, 4226, 4227, 4238, 4244, 4271, 4274 to 4276, 4278 to 4281, 4283, 4285 to 4289, 4290 to 4293, and 4295.

It is very doubtful whether the prickly breast (*alascanus*) and narrow interorbital (*pentacanthus*) which separate *pentacanthus* and *alascanus* are good characters. In this large series some have the prickly breast but narrow interorbital. With a larger series these 2 species would very probably run together.

178. *Xenochirus alascanus* Gilbert.

This species was not taken by us. It was originally described by Gilbert (1895) from vicinity of Unimak Pass at stations 3216, 3219, 3223, 3225 to 3226, 3257, 3258, 3263, 3309 to 3311, 3313, 3322, 3334, 3336, and 3339. Recorded from Karluk (Jordan & Gilbert 1899).

179. *Xenochirus latifrons* Gilbert.

We have 142 specimens, 3.5 to 6 inches long, collected by J. P. Todd near Seattle, 1903.

180. *Odontopyxis trispinosus* Lockington.

One specimen, 2.65 inches long, dredged at station 4221; one specimen, 2.4 inches long, dredged at station 4193; the species also seen at station 4226, near Loring, and station 4243, Kasaan Bay. Recorded from Sitka by Bean (1882) as *Podotheucus trispinosus*.

181. *Aspidophoroides guntheri* Bean.

Originally described by Bean (1886) "from Alaska," in Bering Sea, perhaps. Not found by recent collectors.

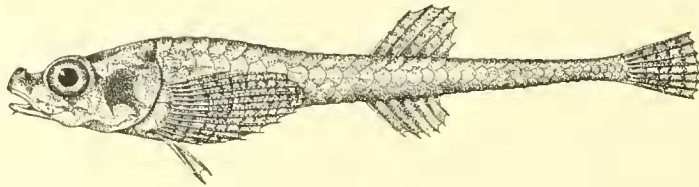


FIG. 97.—*Aspidophoroides guntheri* Bean.

182. *Aspidophoroides bartoni* Gilbert.

Eleven specimens, 2 to 5.25 inches long, were dredged at stations 3599 (Bering Sea), 4273, 4276, 4279, 4283, 4285, 4286, 4289, 4291, and 4292. This species was originally described by Gilbert (1895) from north and south of the Aleutian Islands and in Bristol Bay from 41 different dredging stations, ranging between 3213 and 3311.

183. *Aspidophoroides inermis* Günther.

One specimen, 2.75 inches long, dredged at station 4272; one specimen, 4 inches, mouth Hood Canal, collected by the *Albatross*, 1903. The type of this species came from Unalaska. The species was also taken at Albatross stations 3213, 3219, 3220, 3265, and 3322, these in Bristol Bay and north and south of the Aleutian group.

Family 36. CYCLOPTERIDÆ. The Lump Suckers.**184. *Eumicrotremus orbis* (Günther).**

One specimen 1.1 inches long, mouth of Hood Canal, July 1; one specimen 1 inch long dredged at station 4205; one specimen 1.5 inches long dredged at station 4291; one specimen 3.85 inches long, taken from stomach of cod caught in Bering Sea in spring of 1902 in 500 feet of water. The species has also

been recorded from Iliuliuk, Unalaska, and from St. Paul Island (Bean 1882) as *Eumicrotremus spinosus*. South of Sannak Islands and in Bristol Bay from stations 3213, 3258, and 3274 (Gilbert 1895). Off St. Paul Island (Jordan & Gilbert 1899).

185. *Lethrotremus muticus* Gilbert.

This species, not taken by recent collectors, was described by Gilbert (1895) from stations 3223 and 3258, near Unimak Pass.

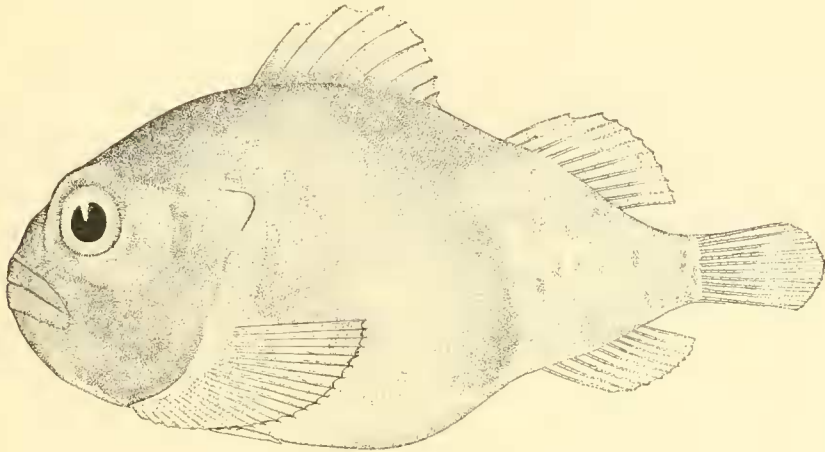


FIG. 98.—*Lethrotremus muticus* Gilbert.

186. *Cyclopteroides gyrynops* Garman.

Recorded from St. Paul Island (Garman 1892) and Dutch Harbor (Jordan & Gilbert 1899).

187. *Cyclopterichthys ventricosus* (Pallas).

No. 02234 and 02298, 8.5 and 7.75 inches long, respectively, collected by Rutter at Karluk in 1903. These 2 specimens show the two different schemes of coloration noted in descriptions. Recorded from St. Paul Island (Kincaid 1899).

Family 37. LIPARIDIDÆ. The Sea Snail,

188. *Neoliparis rutteri* Gilbert & Snyder.

Head 4 in length; depth 4.33; eye 4.6 in head; snout 3; interorbital equal to snout; dorsal v, 28; anal 26; pectoral 33; caudal 14; branchiostegals 6.

Body tadpole-shaped, anterior portion to origin of anal rounded, the remainder greatly compressed; dorsal outline gently arched; ventral outline of 2 gentle arches meeting each other at a broad angle at the origin of anal; head small, depressed; snout broadly rounded viewed from above, truncate from the side; mouth narrow, horizontal, with little lateral cleft and mandible barely included; lips rather thin; teeth small, white, tricuspid, in several rows in each jaw; nostrils inconspicuous, anterior with a small tube; several mucous pores on head along ramus of lower jaw and behind eye; gill-slit narrow, slightly wider than eye, entirely above upper base of pectoral; opercle ending in a soft sharp flap.

Dorsal fin low, its origin over middle of pectoral, its length about 3.5 times head, the fin quite low, the posterior rays longer, margin minutely crenulate, longest ray about 2.5 in head; anal similar to dorsal, its origin under about the third or fourth dorsal ray, last ray of anal slightly posterior to last dorsal ray and both fins slightly united to caudal at the tips of their last rays; caudal truncate, long and slender, its length about 1.2 in head; pectorals broad, of 2 lobes, the upper broad and rounded, lower narrow, its

margin ill defined, and not very distinct from upper lobe; rays somewhat produced, longest ray considerably shorter than upper lobe, length of upper lobe 1.3 in head, tip reaching vent; ventral disk nearly circular, its length 1.6 in head, 13 horny lobes, rather deciduous.

Color jet black above, lighter on belly, a white crescent-shaped line across base of caudal, extending on tip of last dorsal and anal ray; caudal indistinctly barred with black and white bars; dorsal and anal fins dark, edges with a narrow black border.

We have 13 specimens, varying from 0.75 to 2.75 inches long, collected by Mr. Rutter at Karluk, June 8-10, 1903. The species is recorded by Rutter (1899) from Karluk and Uyak Bay.

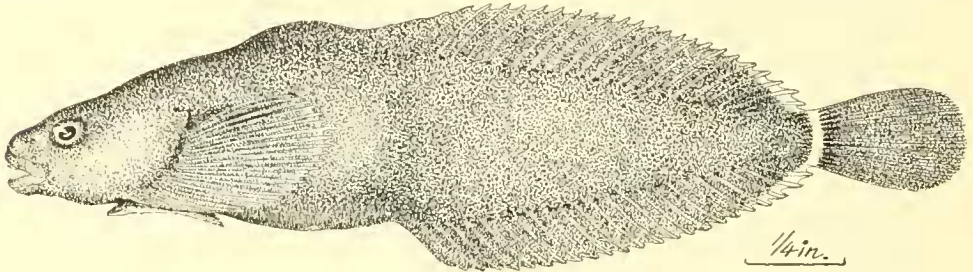


FIG. 99.—*Neoliparis rutteri* Gilbert & Snyder.

189. *Neoliparis calliodon* (Pallas).

One hundred and twenty-six specimens, 0.75 to 5 inches long, secured in 1903 from the following places: Shakan Bay; Diamond Point; Point Ellis; Funter Bay; stations 4205-7; Naha Bay, Loring; Neah Bay, and at Karluk.

Recorded (Bean 1882, as *Liparis calliodon*) from Port Etches; Belkofski; Sanborn Harbor, Shumagins; Natokin Bay, Unalaska; Adak; Amchitka; St. Michael, Unalaska (Gilbert 1895). Karluk and Uyak Bay (Rutter 1899). St. Michael (Turner 1886, as *Liparis calliodon*). Jordan & Gilbert (1899) found it at Captains Harbor, Unalaska; St. Paul Island; St. George Island, and Sitka.

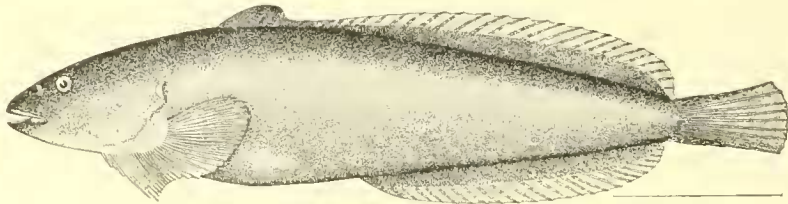


FIG. 100.—*Neoliparis calliodon* (Pallas).

190. *Liparis cyclopus* Günther. (Pl. xviii, fig. 1.)

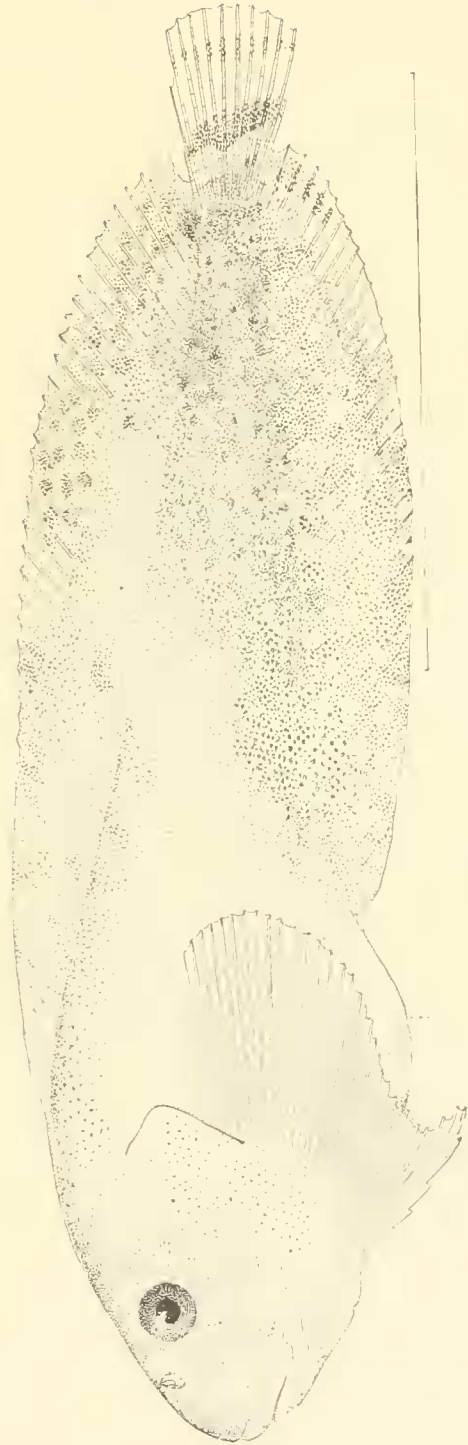
Recorded from Unalaska (Bean 1882) as *Liparis cyclopus*; Atka Island (Turner 1886) as *Liparis cyclopus*; Bristol Bay, at station 3230 (Gilbert 1895).

191. *Liparis fucensis* Gilbert.

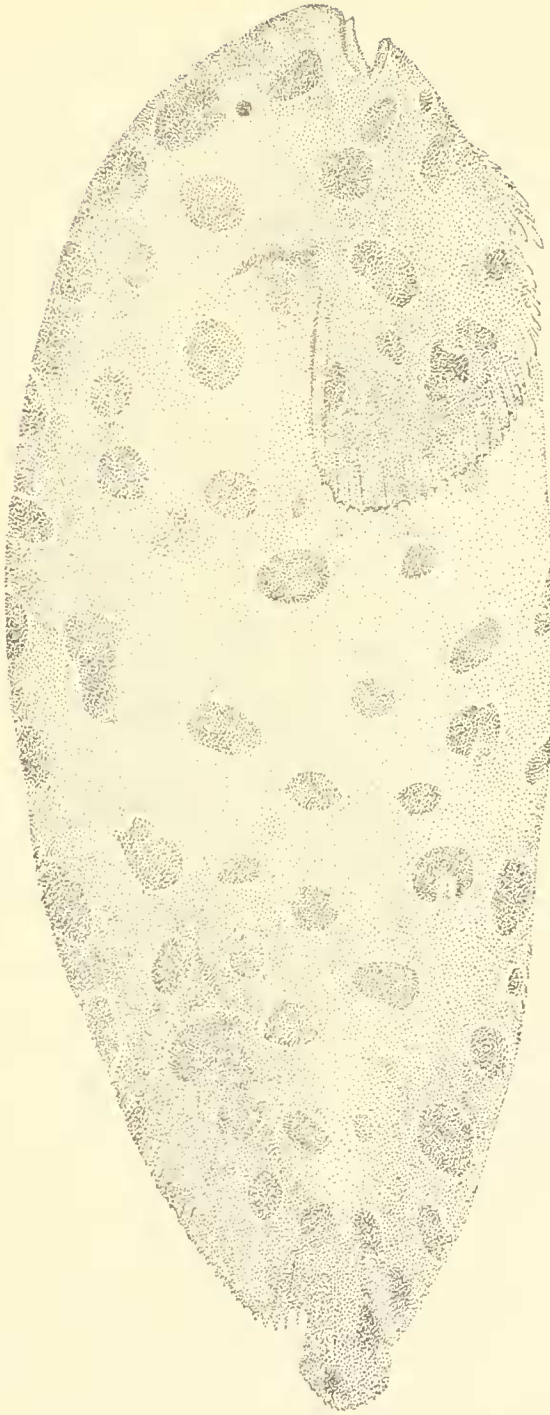
Twelve specimens, 1.4 to 3.25 inches long, dredged at stations 4208, 4220, 4270 to 4272, 4289, and 4302, and mouth Hood Canal; and 22 (small) from station 4256.



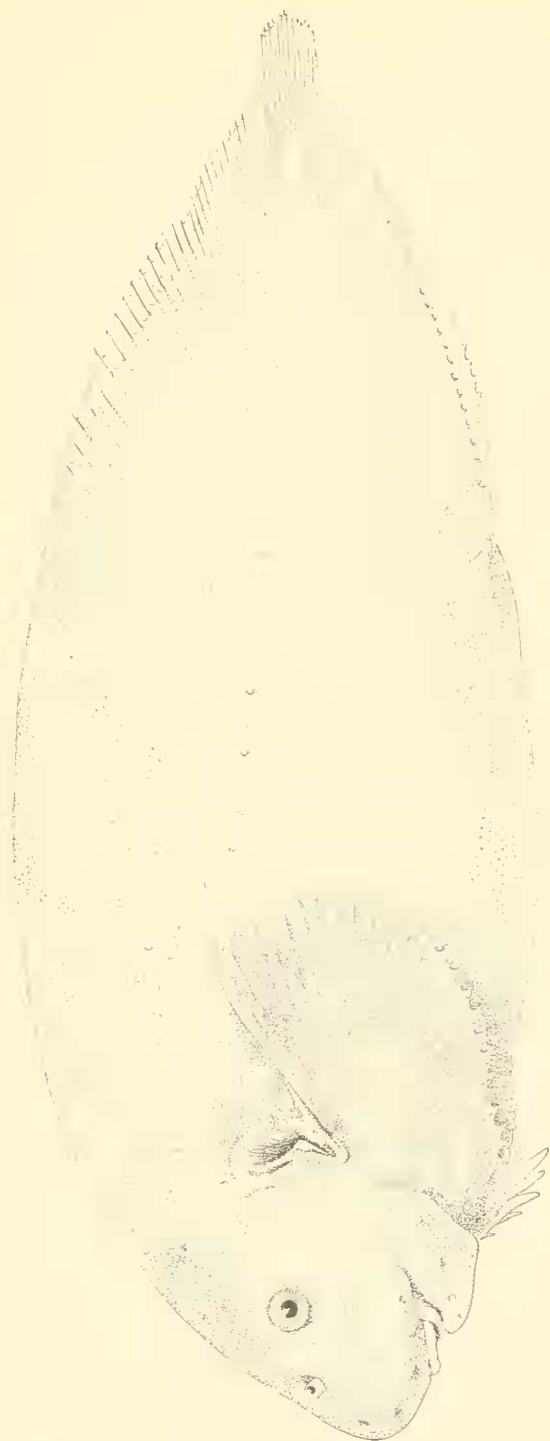
1. LIPARIS CYCLOPUS GÜNTHER.



2. LIPARIS HERSCHELINI SCOFIELD.



LIPARIS CYCLOSTIGMA GILBERT.



1. *CRYSTALLICHTHYS MIRABILIS* JORDAN & GILBERT.



2. *PROGNURUS CYPSELURUS* JORDAN & GILBERT. TYPE.

192. *Liparis agassizii* Putnam.

Recorded from Unalaska and St. Paul Island (Bean 1882) as *Liparis gibbus*. Bristol Bay at stations 3241, 3247, and 3305 (Gilbert 1895). Point Barrow (Murdoch 1885).

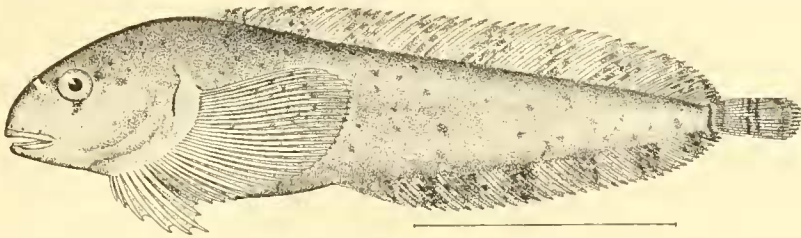


FIG. 101.—*Liparis agassizii* Putnam.

193. *Liparis herschelini* Scofield. (Pl. xviii, fig. 2.)

Recorded from Herschel Island, Arctic Ocean (Scofield 1899).

194. *Liparis cyclostigma* Gilbert. (Pl. xix.)

Originally described by Gilbert (1895) from Bristol Bay at station 3252, near Unalaska.

195. *Liparis pulchellus* Ayres.

Recorded from St. Paul, Kodiak Island, and from Huliuk, Unalaska (Bean 1882); Tongass (Bean 1884); station 3269 in Bristol Bay (Gilbert 1895).

196. *Crystallichthys mirabilis* Jordan & Gilbert. (Pl. xx, fig. 1.)

Recorded from station 3638, off St. Paul Island (Jordan & Gilbert 1899).

197. *Careproctus simus* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska at station 3331.

198. *Careproctus colletti* Gilbert.

One specimen, 3.5 inches long, from station 4295, Shelikof Straits.

This specimen differs somewhat from current descriptions; the head is 4, not 6; distance from tip of snout to origin of anal is 2.5, not 3.66. Color almost white, not dusky, though our specimen may have faded. Mouth and gill cavity not dusky; peritoneum white, not dusky.

This species was originally described by Gilbert (1895) from station 3338, south of Alaskan Peninsula.

199. *Careproctus phasma* Gilbert.

Originally described by Gilbert (1895) from Bristol Bay at stations 3254 and 3256.

200. *Careproctus spectrum* Bean.

Originally described by Bean (1891) from Albatross station 2848, between Unga and Nagai islands.

201. *Careproctus ostentum* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska Island at stations 3324 and 3331.

202. *Careproctus ectenes* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska at station 3331.

203. *Prognurus cypselurus* Jordan & Gilbert. (Pl. xx, fig. 2.)

Originally described by Jordan & Gilbert (1899) from Albatross station 3644, off Bogoslof Island.

204. *Gyrinichthys minytremus* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska Island at station 3331.

205. *Paraliparis holomelas* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska at stations 3308 and 3332. We have 25 specimens taken at stations 4194, 4202, 4251-4253, 4255, 4258, 4292 and 4293.

206. *Paraliparis cephalus* Gilbert.

Recorded by Gilbert (1895) from north of Unalaska at stations 3225 and 3330.

207. *Paraliparis ulochir* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska at station 3332.

208. *Rhinoliparis barbulifer* Gilbert.

Originally described by Gilbert (1895) from north of Unalaska at stations 3227, 3325, 3326, 3329 to 3332.

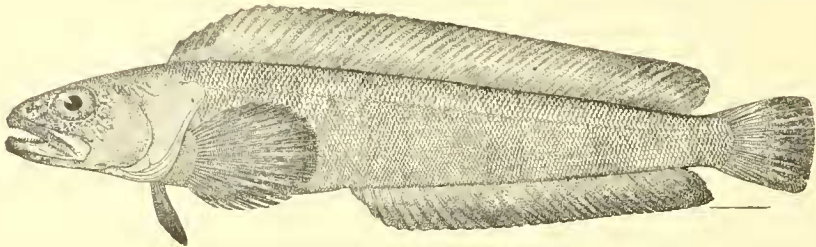


FIG. 102.—*Bathymaster signatus* Cope.

Family 38. BATHYMASTERIDÆ.**209. *Bathymaster signatus* Cope.**

Seventeen specimens 1.5 to 11.75 inches long, collected at stations 3856, 3599 (Bering Sea), 4285, 4289, and at Karluk; Loring; Yes Bay; Redfish Bay; Killisnoo; Sitka; and Pablof Harbor.

It has been recorded (Bean 1882 and 1884) from Sitka; St. Paul, Kodiak Island; Coal Harbor and off Popoff Island, Shumagins; Iliuliuk, Unalaska; Mary Island; Fort Wrangell; Port Chester and Nakat. Gilbert (1895) records it as very abundant in the shallow water dredgings along the southern shore of the Alaskan Peninsula, northward through Unimak Pass and north of Unalaska at stations 3211 to 3215, 3217, 3220, 3222, 3223 and 3319, and Jordan & Gilbert (1899) record it from Sitka.

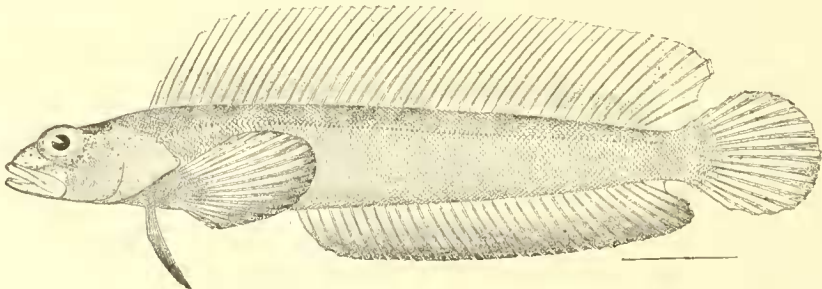


FIG. 103.—*Ronquilus jordani* Gilbert.

210. *Ronquilus jordani* Gilbert.

The collection contains 37 specimens 2.5 to 6.75 inches long taken in Admiralty Inlet, at Hood Canal, and at stations 1193, 1197, 4204, 4209, 4212, 4213, 4220, 4228, 4272, 4278 and 4289. The species was originally described by Gilbert (1889) as *Bathymaster jordani* from Fort Wrangell. He also records it under the same name from station 3262 in Bristol Bay.

Family 39. TRICHODONTIDÆ.

211. *Trichodon trichodon* (Tilesius).

We have 1 specimen 2.5 inches long collected by the *Albatross* in Akutan Bay, September 17, 1894.

The species has been recorded (Bean 1882) as *Trichodon stelleri* from Coal Harbor and Humboldt Harbor, Shumagins; Unalaska, and Cape Etolin, Numivak Island. Bristol Bay at station 3260 and from Herendeen Bay (Gilbert 1895). Mr. H. C. Fassett examined a specimen at Klawak in 1905 which was taken near that place.

Though rare, this curious fish appears to be widely distributed in Alaska.

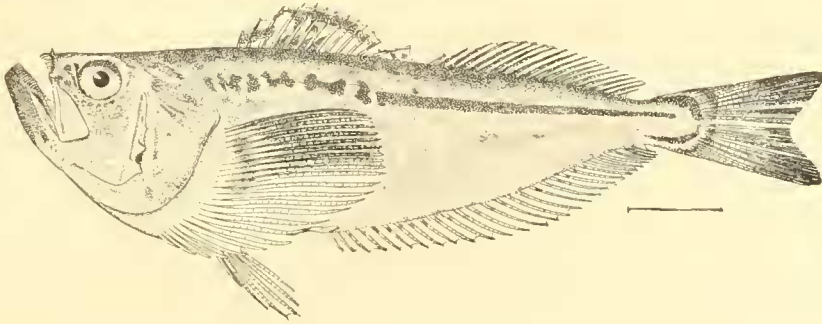


FIG. 104.—*Trichodon trichodon* (Tilesius).

212. *Arctoscopus japonicus* (Steindachner).

We have 1 specimen 1 inch long collected by the *Albatross* in Akutan Bay, July 24, 1894.

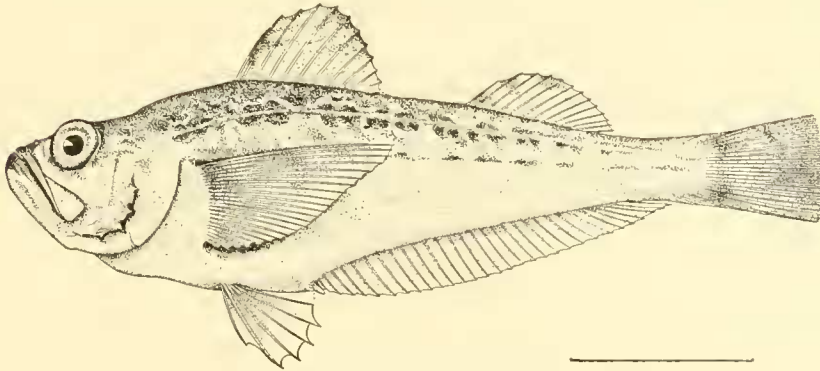


FIG. 105.—*Arctoscopus japonicus* (Steindachner).

Family 40. BATRACHOIDIDÆ. The Toadfishes.

213. *Porichthys notatus* Girard.

The collection contains 6 specimens 5 to 6.75 inches long, collected at Union Bay and at station 4218.

Family 41. GOBIESOCIDÆ. The Clingfishes.

214. *Caularchus mæandricus* (Girard).

The collection contains 2 specimens, each 2.75 inches long, seined at Fort Rupert June 28, 1903. We also have 2 specimens 1.5 and 2.25 inches long taken at Gabriola Island by the *Albatross*.

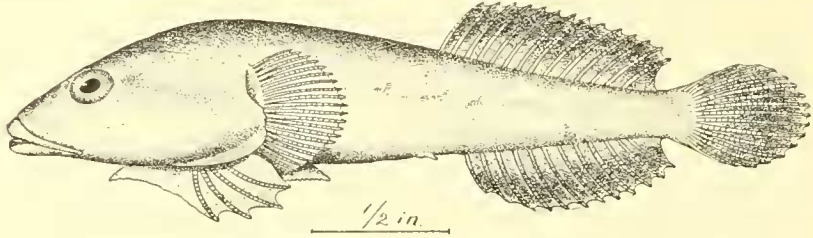


FIG. 106.—*Caularchus mæandricus* (Girard).

Family 42. BLENNIDÆ. The Blennies.

215. *Bryostemma polyactcephalus* (Pallas).

One specimen 7 inches long seined at station 4228; 2 specimens 4.5 inches long dredged at station 4205; no. 2914, a specimen 11.4 inches long, from station 4253.

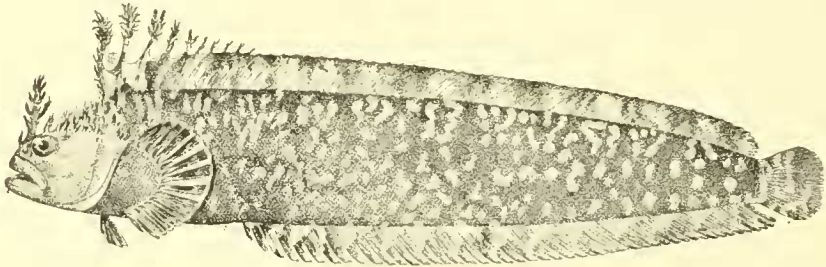


FIG. 107.—*Bryostemma polyactcephalus* (Pallas).

In the smaller examples the cirri on the top of head are coarse, thick, and blunt; in the larger examples they are quite different, being small and hairlike and not so numerous.

Recorded from stations 3213 and 3274, north and south of the Alaskan Peninsula (Gilbert 1895) as *Chirolophus polyactcephalus*. St. Michael (Nelson 1887) and St. Paul (Jordan & Gilbert 1899).



FIG. 108.—*Apodichthys flavidus* Girard.

216. *Apodichthys flavidus* Girard.

The collection contains 22 specimens 4 to 8 inches long from Sucia Island, May 6, 1894.

217. *Pholis dolichogaster* (Pallas).

Recorded from Kigiktoiwik and Unalakleet, Norton Sound (Nelson 1887) as *Muraenoides ruberrimus*, and from Aleutian Islands (Bean 1882) as *Muraenoides dolichogaster*.

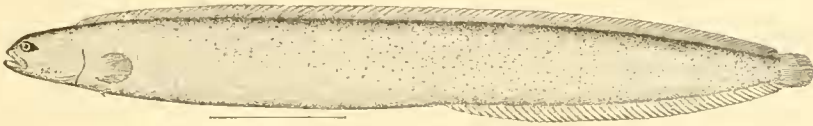


FIG. 109.—*Pholis dolichogaster* (Pallas).

218. *Pholis fasciatus* (Bloch & Schneider).

We have 14 specimens 2.25 to 3 inches long, collected by Rutter at Karluk June 8-10, 1903, and one specimen 7 inches long collected by Mr. M. C. Marsh at St. Paul Island, Pribilof Group, 1906. The species has been recorded from St. Paul Island (Bean 1882) as *Muraenoides maxillaris* and from Bristol Bay at stations 3230, 3232 to 3234 (Gilbert 1895).

219. *Pholis gilli* Evermann & Goldsborough, new species.

Head 8.66 in length; depth at origin of dorsal 10.5; eye 5 in head; snout 5; maxillary 3.25; mandible 2.5; interorbital 1.5 in eye; dorsal LXXXIV; anal II, 44; pectorals 15; branchiostegals 4.

Body elongate, greatly compressed, almost ribbon-shaped; head small, upper profile arched, anterior profile rounded; a high sharp ridge from nape to snout; snout blunt, short; mouth small, very oblique; jaws nearly equal; maxillary reaching anterior edge of orbit; teeth conical, stout, in a single row in the jaws, except for a patch on anterior edge of lower jaw, none on vomer and palatines; upper lip a high, thin fold continuous posteriorly with the fold on lower lip, latter interrupted by a

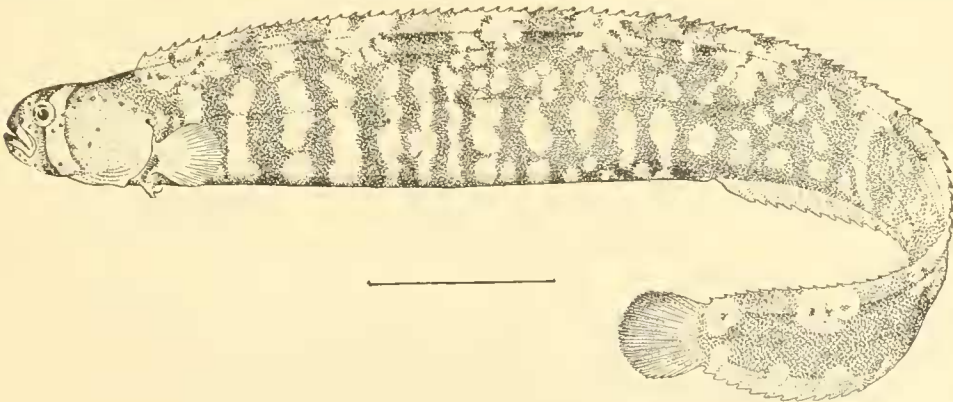


FIG. 110.—*Pholis gilli* Evermann & Goldsborough, new species. Type.

broad frenum; nostrils close behind upper lip, posterior in a small tube; a row of conspicuous tubes below eye running backward and upward posteriorly; gill-opening free from isthmus, forming a broad fold, not continued forward; eye small, anterior, high.

Origin of dorsal above base of pectoral, its anterior spines concealed in membrane, short, gradually lengthening posteriorly, the spines not concealed, the longest spine slightly longer than eye; dorsal and anal connected for their entire height, forming a slight notch with the broad rounded caudal, the length of caudal about half head; anal low, with 2 short stout spines, membranes thick, nearly concealing the rays; vent midway between root of pectoral and base of caudal; pectoral short and broadly rounded, 2.5 in head; ventral very minute, its rays about equal to spine, which equals pupil. Scales minute, covering body, head naked.

Color in alcohol: General color brown, the minute scales giving this brown the appearance of small white punctulations; a series of 10 white blotches punctate with brown along base of dorsal, each one extending from upper edge of fin down upon body, forming semicircular patches about as large as pectoral fin; a series of irregular white parallel bars about as wide as eye on anterior lower half of side, these broken posteriorly into rows of dots; head pale beneath, a white stripe extending from front of occiput through eye to posterior tip of mandible, broadening somewhat as it descends, another small white stripe extending vertically along anterior margin of orbit; snout and lower lip brown, chin white; caudal and anal dusky; ventral and pectoral plain; dorsal general color of back.

This fish differs from the description of *P. dolichogaster* in having the anterior spines of dorsal short, also in having a sharp ridge on interorbital space, and the color entirely different.

The above from the type, no. 57826, U. S. National Museum, a specimen 6.75 inches long collected in Bering Sea in 1902, sent in by Mrs. E. W. Clark, of Washington, D. C.

Named for Dr. Theodore Nicholas Gill.

220. *Pholis ornatus* (Girard).

The collection contains 208 specimens 1.6 to 8 inches long. It is common along the shores from Port Townsend to Unalaska and was collected at the following places: Marrowstone Point; Admiralty Head; Port Townsend; Fort Rupert; Union Bay; Whidby Island; Kilisnoet Harbor; Duncan Canal; Sucia Island; Tongass Harbor; Metlakatla; Loring; Yes Bay; Karta; Klawak; Shakan; Funter Bay; Anka River; Karluk; Litnik; and Unalaska.

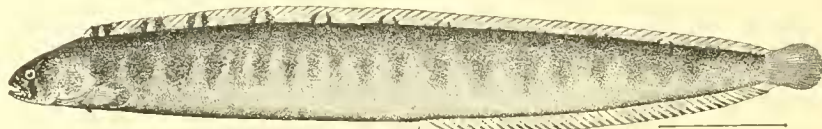


FIG. 111.—*Pholis ornatus* (Girard).

There are 2 very distinct color patterns in our specimens. Most of them have the ocellate spots on the dorsal and upper part of body; others have broad U-shaped dark marks on dorsal and upper part of body instead of these dark spots. The latter have from 1 to 3 dark spots on anterior rays of dorsal, these sometimes indistinct.

This species has been recorded as *Muraenoides ornatus* (Bean 1882) from Sitka; Port Mulgrave, Yakutat Bay; Port Etches; Chugachik Bay and Refuge Cove, Cook Inlet; Kodiak; Coal Harbor and Sanborn Harbor, Shumagins; Belkofski, Alaska Peninsula; Huliuk, Unalaska; Atka; Adak; Amchitka; Attu and Port Moller, and under the same name by Bean in 1884 from Wrangell and Tongass, Unalaska and Herendeen Bay (Gilbert 1895). Karluk and Uyak and Alitak bays (Rutter 1899). Atka Island (Turner 1886) as *Muraenoides ornatus*.

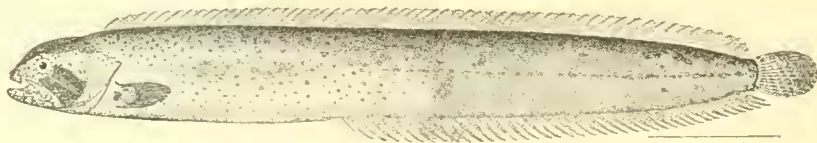


FIG. 112.—*Anoplarchus atropurpureus* (Kittlitz).

221. *Anoplarchus atropurpureus* (Kittlitz).

This collection contains 204 specimens one-half to 4.5 inches long. The species is common along the shore from Port Townsend to Bering Sea. It was taken at the following places: Gabriola Island, Point Ellis, Fort Rupert, Port McArthur, Loring, Shakan Bay, Klawak, Alitak Narrows, Karluk, Uyak Bay, and Atka Island.

It has been recorded from St. Michael by Nelson (1887). By Bean (1882) from Sitka; Port Mulgrave; Kodiak Island; Coal Harbor, Sanborn Harbor, and Popoff Straits, Shumagins; Unalaska;

Nazan Bay, Atka; Amchitka; Kyska Harbor; Port Etches; St. Michael. Wrangell, Mary Island, and Tongass (Bean 1884). Unalaska (Gilbert 1895). Rutter (1899) found it common at Karluk, and in Uyak, and Alitak bays.

222. *Xiphistes chirus* (Jordan & Gilbert).

Recorded by Bean (1882) from Adak and Amchitka, Aleutian Islands.

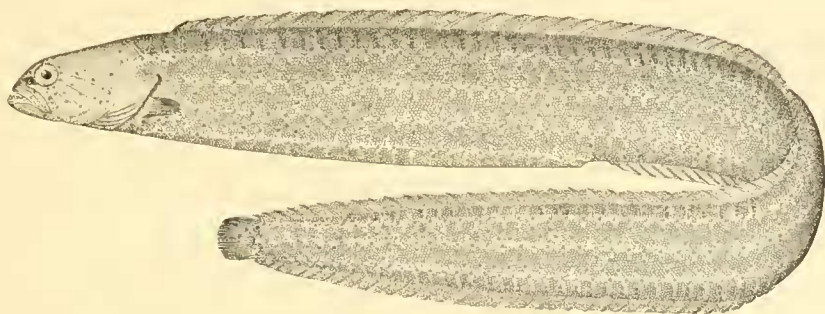


FIG. 113.—*Xiphistes chirus* (Jordan & Gilbert).

223. *Xiphidion mucosum* Girard.

The collection contains 14 specimens, 1.5 to 6.75 inches long, collected at Gabriola Island, Point Ellis, and Port Rupert. The species has been recorded from Wrangell and Mary Island by Bean (1882) as *Xiphistes mucosus*.

224. *Xiphidion rupestre* (Jordan & Gilbert).

We have 1 specimen 5 inches long from Cedar Island, Loring, June 17, 1904. Bean (1882) records it from Sitka as *Xiphister rupestris*.

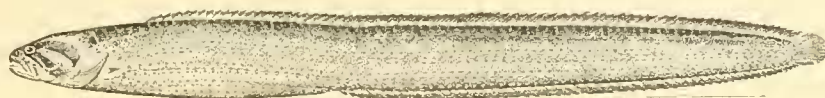


FIG. 114.—*Xiphidion rupestre* (Jordan & Gilbert). Type.

225. *Opisthocentrus ocellatus* (Tilesius).

We have 8 specimens, 5.5 to 7 inches long, collected at Tarbinski Harbor, Kamchatka, 1900, by the *Albatross*.

226. *Leptoclinus maculatus* (Fries).

The collection contains 3 specimens 4 to 5.5 inches long from Albatross stations 4274 and 4279. Recorded from station 3223 in Unimak Pass and stations 3252, 3253, 3257 to 3259, 3279 and 3309, all in Bristol Bay (Gilbert 1895).

227. *Poroclinus rothrocki* Bean.

Originally described by Bean (1891) from Albatross station 2852, between Nagai and Big Koniushi Island. Station 3312, north of Unalaska Island (Gilbert 1895).

228. *Lumpenus medius* (Reinhardt). (Pl. XXI, fig. 1.)

Head 5 in length; depth 8.9; eye 3.5 in head; snout 4.6; interorbital 3 in eye; dorsal LVIII; anal II, 35 (35 to 38); pectoral 14; ventral 3; caudal 2.2 in head; ventral 2.75; pectoral 1.35.

The collection contains 21 specimens, 2.5 to 11 inches long, collected at stations 4243, 4270 to 4272, 4274 to 4276, 4280, 4281, 4287, and in Kasaan Bay.

229. *Lumpenus anguillaris* (Pallas).

This species was found to be quite common. It was taken at various points and seen at many others from Seattle to Atka Island. One hundred and fifty-two specimens, ranging from 1.75 to 14.5 inches in length, were secured from the following places: Seattle; Kilisut Harbor; Duncan Canal; Loring; Ankan River; Nex Morzhovoi; Pablot Harbor; Akutan Bay; Makushin Bay; Unalaska; Atka; and stations 4214, 4218, 4236, 4272, and 4296.

Recorded (Bean 1882) from Port Mulgrave, Yakutat Bay; Chugachik Bay, Cook Inlet; Port Levashof, Iliuliuk and Clernofski, Unalaska; Wrangell and Sitka, and, in cruise of the *Corwin*, from Point Belcher. Also from Norton Sound (Nelson 1887). Nakat Harbor and Boca de Quadra (Bean 1884); Unalaska (Gilbert 1895).

230. *Lumpenus mackayi* Gilbert.

Originally described by Gilbert (1895) from mouth of Nushagak River.

231. *Lumpenus fabricii* (Cuvier & Valenciennes).

Recorded from Bristol Bay at stations 3241 to 3244 (Gilbert 1895) as *Leptoblennius nubilus*.

232. *Lumpenus longirostris* Evermann & Goldsborough, new species.

Head 5.25 in length; depth 8.2; eye 4.75 in head; snout 2.8; dorsal LXII (LXIII to LXXI); anal III (III to V), 39 (38 to 42); interorbital 1.2 in eye.

Body elongate, compressed; head long, compressed, interorbital slightly convex; eye large, elongate, median, high; snout long, blunt, and projecting, mouth small, nearly horizontal, lower jaw included; maxillary not nearly reaching eye, reaching halfway from tip of snout to posterior edge of eye; teeth in a single crowded row on each jaw, crowded and more or less in a patch anteriorly, no teeth on vomer or palatines; gill-openings continued forward to below anterior edge of pupil, the membranes then narrowly joined to isthmus.

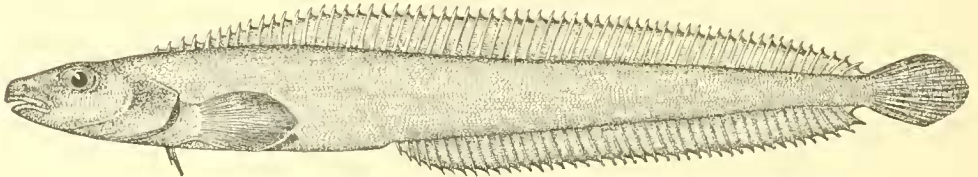


FIG. 115.—*Lumpenus longirostris* Evermann & Goldsborough, new species. Type.

Dorsal fin beginning immediately above upper end of gill-opening, the spines short, strong, and pungent, none of them flexible, the anterior ones very short, less than width of pupil, the fin gradually increasing in height to opposite front of anal, thence decreasing very slowly to posterior end, the longest spine about 1.3 in snout, the third ray from last two-thirds height of longest ray, the tips of the spines naked for about one-quarter of their height; anal with 3 (in most examples 4) strong spines similar to those of dorsal fin, the first half as high as second, which equals third, soft rays all forked and of about equal length, the last 3 free for upper third of their length; caudal rounded, 1.9 in head; ventral short, of 1 short sharp strong spine, equal to perpendicular diameter of eye, and 3 simple rays, the fin 2 in snout; pectoral large, rounded, the middle rays longest, 1.5 in head.

Scales small, smooth, rounded, covering entire body and head, those of head smaller and more closely imbricated.

The foregoing description from the type no. 57827 U. S. National Museum, a specimen 9.3 inches long, taken in Lynn Canal, July 16, 1903, at Albatross station 4255. The Bureau of Fisheries cotype is no. 5232; Stanford University Museum, no. 20013; Field Museum of Natural History, no. 6116; Academy of Natural Sciences, Philadelphia, no. 33005.

Life colors of one example: Back and upper side light olivaceous with darker brownish blotches; middle of side and underparts sooty blue; middle part of belly blackish; pectoral and ventral dark; dorsal pale yellowish at base, a narrow dark line near edge.^a

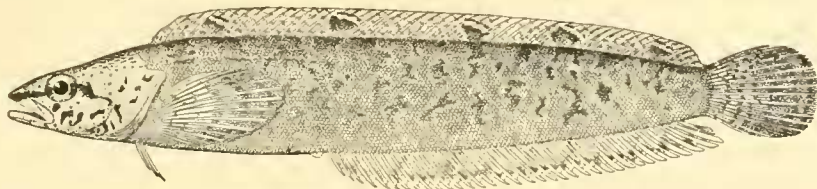
^aNot necessarily color of type, it not being known from which specimen the note was taken.

Color in spirits, grayish olivaceous, edge of dorsal, anal, and of gill-opening black; pectoral, caudal, ventral, and lips black; a dark blotch on opercle; belly and top of head slightly darker than body.

MEASUREMENTS OF 19 EXAMPLES OF *LUMPENUS LONGIROSTRIS* FROM STATION 4254.

No.	Length.	Head.	Depth.	Eye.	Snout.	Dorsal.	Anal.
	<i>Inches.</i>						
52	6½	5½	9½	4½	2½	LXV	IV, 40
53	8	5½	9½	5	2½	LXVI	IV, 40
54	7	5½	9½	5	2½	LXX	IV, 42
55	7	5½	9½	5	2½	LXV	IV, 40
56	6½	5½	9½	5½	3	LXV	IV, 41
57	6½	5½	9½	5½	2½	LXVI	IV, 41
58	8½	5½	9½	5½	2½	LXIV	IV, 40
59	5½	5½	10	5	2½	LXIV	V, 38
60	6½	5½	9½	5½	2½	LXIV	IV, 41
61	5½	5½	9½	5	3	LXIV	IV, 39
62	4½	5½	10½	4½	3	LXIV	IV, 40
63	7½	6½	9½	5	2½	LXVII	IV, 43
64	8½	6	8½	5½	2½	LXV	IV, 40
65	7½	5½	9½	5½	2½	LXIV	IV, 41
66	7½	5½	9½	5	3½	LXIV	IV, 40
67	7	5½	8½	5	2½	LXIV	IV, 40
68	6	5½	9½	5½	3	LXIV	IV, 41
69	7½	5½	9½	4½	3	LXV	IV, 39
70	6½	5½	10	5½	2½	LXVI	IV, 42

This species may be readily distinguished by its very long snout, in which respect it differs from all the other species of *Lumpenus*, and in the naked tips of the dorsal spine. We have 60 other specimens, ranging in length from 2.5 to 9.87 inches, all of which we take as cotypes. They were collected at stations 4238, 4251, 4252, 4254, 4255, and 4256.

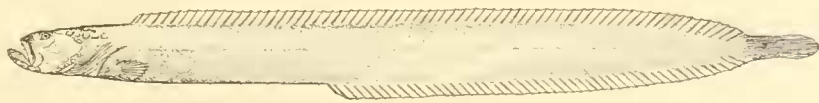
FIG. 116.—*Stichæus punctatus* (Fabricius).233. *Stichæus punctatus* (Fabricius).

Recorded from St. Michael (Nelson 1887, Bean 1879). Cape Lisbourne (Bean 1882) as *Notogrammus rothrockii*. Bristol Bay at station 3239 and from Karta Bay (Gilbert 1895).

Family 43. CRYPTACANTHODIDÆ.

234. *Delolepis virgatus* Bean.

The collection contains a specimen (no. 1660), 40 inches long, collected at Dutch Harbor, 1893 or 1894. Species originally described by Bean (1882) from Kingcombe Inlet, British Columbia, and Port Wrangell; recorded also from Unalaska (Gilbert 1895).

FIG. 117.—*Lyconectes aleutensis* Gilbert.235. *Lyconectes aleutensis* Gilbert.

Originally described by Gilbert (1895) from station 3312, north of Unalaska.

Family 44. ANARHICHADIDÆ. The Wolf-Fishes.

236. *Anarhichas lepturus* (Bean).

Recorded from St. Michael and Kigiktoiwik (Nelson 1887); also from St. Michael (Turner 1886).



FIG. 118.—*Anarhichas lepturus* (Bean).

Family 45. PTILICHTHYIDÆ. The Quill-Fishes.

237. *Ptilichthys goodei* Bean.

One specimen, 13.5 inches long, from Snug Harbor, August 6, 1903, caught in dip net over rail of ship. Originally described by Bean (1882) from Port Levashev, Unalaska. Recorded by Gilbert (1895) from station 331, Unalaska Harbor.

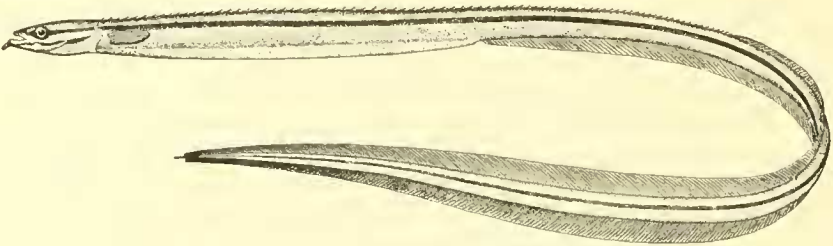


FIG. 119.—*Ptilichthys goodei* Bean.

Family 46. ZOARCIDÆ.

238. *Lyciscus crotalinus* (Gilbert).

Recorded by Gilbert (1895) as *Lycodopsis crotalinus* from station 3210, south of Sannak Island.

239. *Lycodopsis pacificus* (Collett).

This species, not heretofore recorded north of Puget Sound, was taken at station 4272, in Afognak Bay, and also at stations 4214, 4219, 4223, and 4233, and at Seattle. Twenty-three specimens, ranging from 3 to 8.75 inches in length, were collected. In some there is a very evident black blotch on the upper part of the 3 or 4 anterior dorsal rays.

240. *Lycodes concolor* Gill & Townsend.

Described from Bering Sea, latitude 55° 19' north, longitude 168° 11' west, at *Albatross* station 3608, in 276 fathoms.

241. *Lycodes digitatus* Gill & Townsend.

Described from Bering Sea, latitude 56° 14' north, longitude 164° 8' west, at *Albatross* station 3541, in 49 fathoms.

242. *Lycodes palearis* Gilbert.

The collection contains 7 specimens, 2.25 to 15.5 inches long, taken at stations 4223, 4246, 4272, and 4273.

The species was originally described from stations 3253 and 3254, Bristol Bay (Gilbert 1895).

243. *Lycodes jordani* Evermann & Goldsborough, new species.

Head 7 in total length; depth 14; eye 4.5 in head; snout 3.5; maxillary 2.9; interorbital 3 in length of eye; length of pectoral 2.1 in head; ventral 1.5 in eye; dorsal 116; anal 93 (dorsal and anal counts taken from cotype).

Head and nape naked, rest of body fully scaled, except the axil of pectoral, which is naked; dorsal origin over anterior part of pectoral; anal origin under about the eighteenth dorsal ray; pectorals nearly rounded in outline, the fourth to seventh rays from the upper part being the longest, all the rays except a few upper free at their tips, the free margin about equal in length to pupil.

Top of head flat, the interorbital space about equal to pupil, the bone being much narrower, about one-fourth the space; maxillary reaching anterior edge of pupil; small villiform teeth on vomer, palatines, and jaws, those on jaws in a single row laterally, broadening into a patch anteriorly; a row of 4 large pores on mandible, the row continued in 3 similar pores on preopercle; 6 similar but smaller



FIG. 120.—*Lycodes jordani* Evermann & Goldsborough, new species. Type.

pores extending from anterior nasal opening just above maxillary and posteriorly under eye, the last pore above the next to last in lower row; anterior nasal opening with short tube; lower jaw included; upper jaw reaching very slightly beyond lower, for a distance less than half width of pupil; lateral line not evident.

General color: Brownish olivaceous, the scales on body and fins white, giving the body the appearance of being white spotted, the pectoral, head, and edges of dorsal and anal a darker olive than that of body.

Another specimen from station 4267, and which we take as a cotype, gives the following measurements: Head 6.8 in total length; depth 16.5; eye 4.66 in head; snout 3.9; interorbital 1.3 in eye, the bone about 4 in eye; maxillary 3 in head; mandible 3.4; ventral equaling eye; pectoral 2 in head; dorsal 116; anal 93.

This species is near *Lycodes palearis*, differing in depth, in color, in the shorter upper jaw, and in other characters.

Type, no. 57828, U. S. National Museum (field no. 2439), a specimen 13.25 inches long from Albatross station 3788, and cotype, no. 20014, Stanford University Museum, a specimen 8.4 inches long from station 4267.

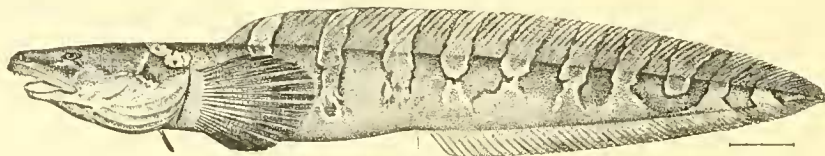
244. *Lycodes brevipes* Bean.

This species was found to be very common in the deep waters from Puget Sound to Shelikof Strait. Sixty-three specimens, 2.5 to 10.75 inches long, are in the collection. These were taken at stations 2818, 4201, 4218, 4246, 4248, 4250, 4252, 4254 to 4256, 4258, 4275, 4280, 4283, 4285, 4291 to 4293, 4295, and 4296.

Originally described by Bean (1891) from Unga and Nagai islands, at Albatross station 2848; recorded also from stations 3216, 3225 to 3227, 3263, 3309 to 3311, 3313, and 3330, located north and south of the Aleutian Islands and in Bristol Bay (Gilbert 1895), and from off Karluk (Jordan & Gilbert 1896).

245. *Lycodalepis turneri* Bean.

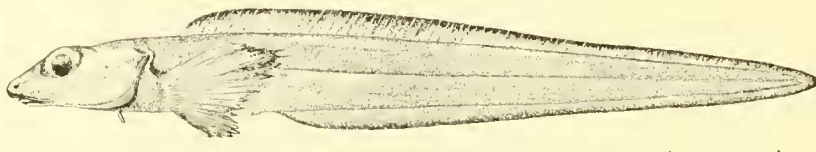
Recorded by Bean (1879) as *Lycodes turneri* from St. Michael and (1882) as *Lycodes coccineus* from Big Diomede Island, Bering Strait. Point Barrow (Murdoch 1885) as *Lycodes turneri* and *Lycodes coccineus*. Norton Sound (Nelson 1887) and Point Barrow (Scofield 1899), both as *Lycodalepis turneri*.

FIG. 121.—*Lycodalepis turneri* Bean.246. *Furcimanus diaptera* (Gilbert).

Thirty-nine specimens of this species, ranging in length from 2.45 to 12.5 inches long, were taken at stations 4198, 4236, 4238, 4251, 4255.

The color in all the large specimens is uniform and the bars are lacking; in the medium-size ones the bars are very faint; some of the small ones are nearly plain, others distinctly barred.

Recorded by Gilbert (1895) as *Lycodes diapterus* from north of Unalaska, at stations 3227, 3324, 3326, 3329 to 3332.

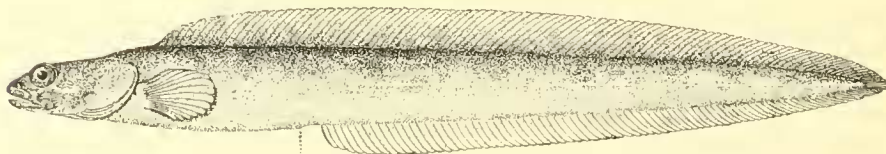
FIG. 122.—*Furcimanus diapterus* (Gilbert).247. *Bothrocara pusilla* (Bean).

The collection contains 14 specimens, 4.75 to 6 inches long, dredged at stations 4251, 4252, 4255, 4256.

Originally described by Bean (1891) as *Maynca pusilla* from off Nagai Island, Albatross station 2848. North of Unalaska at stations 3224, 3227, 3330, and 3331 (Gilbert 1895).

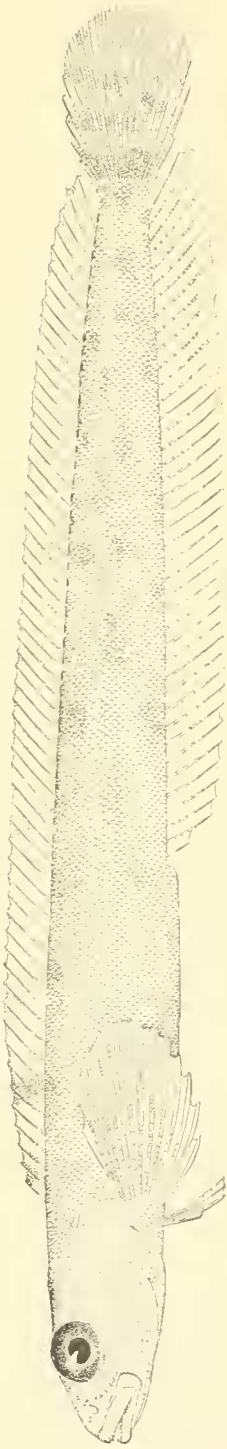
248. *Bothrocara mollis* Bean. (Pl. XXI, fig. 2.)

Recorded from Albatross station 3634, off Bogoslof Island (Jordan & Gilbert 1899).

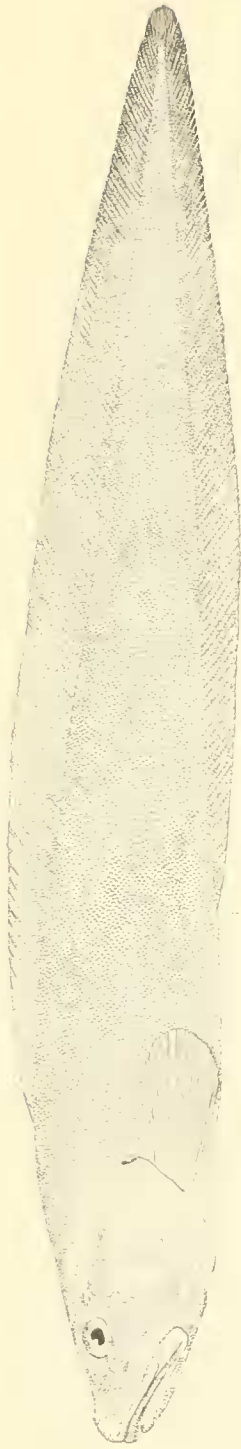
FIG. 123.—*Gymnelis viridis* (Fabricius).249. *Gymnelis viridis* (Fabricius).

Three specimens, 3 to 4 inches long, collected by Mr. Rutter at Karluk, June 8-10, 1903.

These specimens differ somewhat from current descriptions. The head is 8 not 6.5 in length, and color in alcohol is almost uniform cherry red; 2 of the specimens have a conspicuous white bar along the cheek, which is faint in the third specimen.



1. LUMPENUS MEDIUS (REINHARDT).



2. BOTHROCARA MOLLIS BEAN.

